MACHINEGUN

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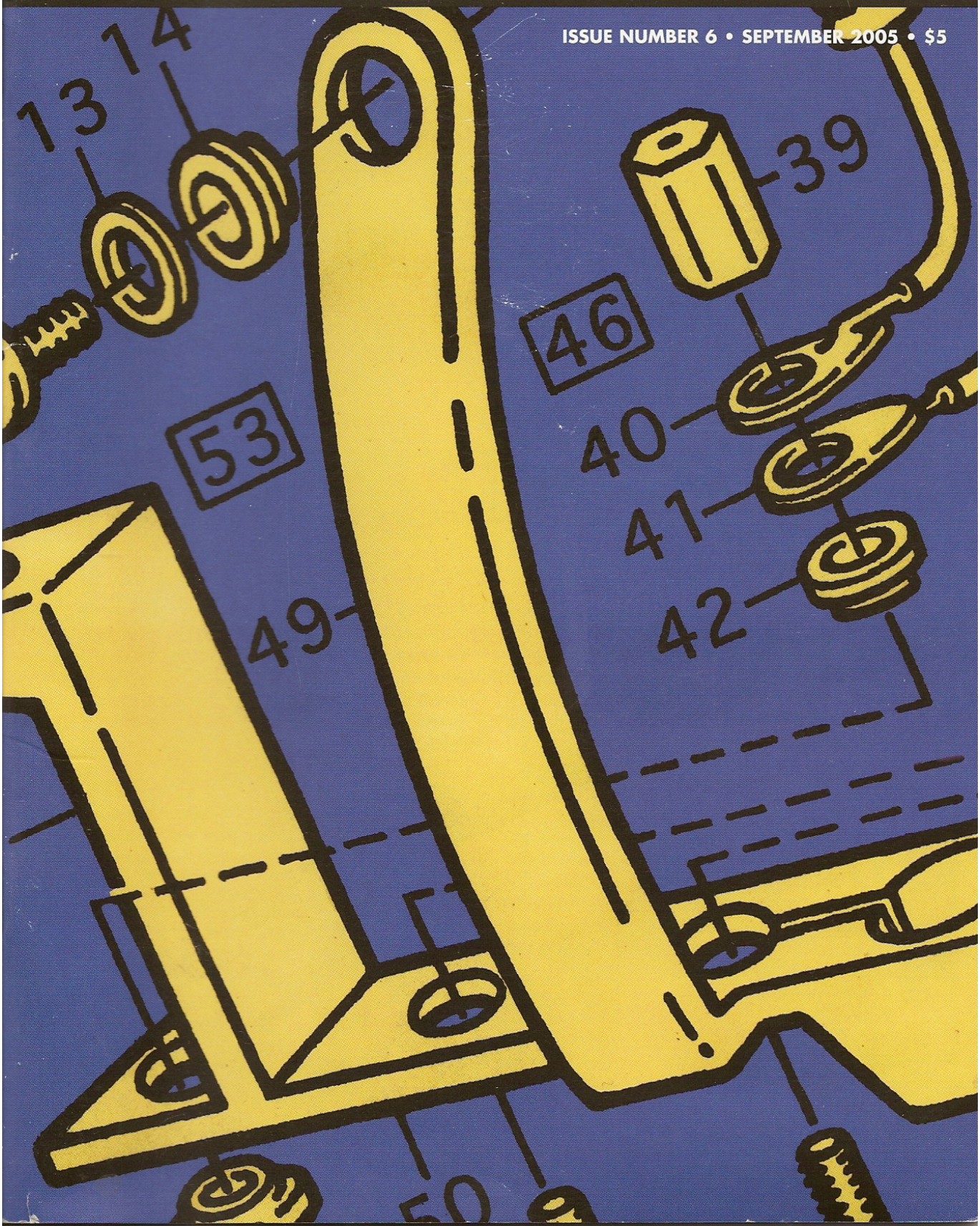

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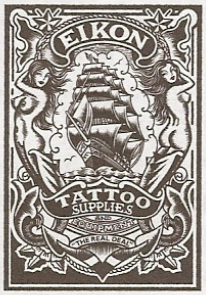

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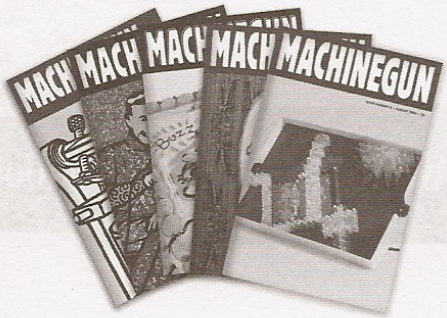

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Avoid the Rush - Quit Tattooing Today

EIKON DEVICE INC.™
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EDITORIAL

BY BILL BAKER

People get tattooed for one of two reasons: to be included, or to be excluded. It's as simple as that. When you reduce it to fundamental motivation, people get tattooed to be included into a group or circle of friends that have tattoos; or they get tattooed to exclude themselves from a group that do not have tattoos. Two very different kinds of people - in both cases they get tattooed, but the reason why each of them get tattooed could not be more different.

Tattoo artists were customers before they picked up a machine.

Tattoo artists were customers before they picked up a machine. When you consider what kind of customers they were, you will realize that some of them very obviously got tattooed and are involved in the trade for reasons of exclusion, and some very obviously for reasons of inclusion.

There has always been division in tattooing – that won't change, but understanding where that division comes from is important. Tattoo artists generally don't feel that they are part of a unified trade because there isn't one, and there probably never will be because there are two fundamentally different types of people involved in tattooing. Even inclusion-motivated tattoo artists tend to look at their exclusion-motivated counterparts and feel that they are not a part of "that kind" of tattooing. Exclusion-motivated tattoo artists generally don't want to be included in anything.

No matter what you don't like or understand about the way tattooing is, you don't function in exclusion. There is an entire tattoo trade out there, with all kinds of tattoo artists. Maybe we're not all equal, but we're all part of tattooing and we're all contributing to the good or bad that's going on. MGM

GREEN MONSTER

the final chapter

The top speed, record setting Green Monster has been set aside. Now we're going to set up four machines: a small configuration liner, a big configuration liner, a black and grey shader, and a coloring machine.

All four of the frames are identical. We've decided to use the same geometry for all of the machine set-ups for two reasons. First was simplicity of construction. Once we had the jigs made and set up for one frame, it just made sense to make a few frames. The second reason for using identical geometry was to show what effect changing components on a machine has on machine function.

We're putting identical pairs of Eikon Crown Standard coils into each of the frames for the same reason that the frame geometry is the same, so that it's easier to compare any of the parts on the machines that are different.

Frame geometry and coils are not usually components that most tattoo artists take into account when comparing two machines. Any part on one machine will not necessarily act the same on another machine unless all of the other parts on both machines, including the frame geometry and coils, are identical.

To push this theory slightly further, we're also going to install identical high-lift lightweight Tru-spring armature bars into the machines. Even with so many identical components, we're going to set up four very different machines by changing only spring thickness, capacitors and stroke length.

Choosing Parts

There is no formula that can help to choose what parts will work best on your machine set-up. You cannot accurately predict how a machine part will interact with all of the other parts and adjustments that make up the machine set-up. In most cases, trial and error are a suitable means of choosing the components on a machine. The desired outcome of the machine set-up must be pre-determined. Simply put, you need to know how fast you want the machine to run, and you need to know how much force the machine should have before you start trying different parts on the machine.

Establishing Desired Speed and Force

Machine #1
Small Configuration Liner

DESIRED SPEED – 160Hz

I'm used to working with liners that run at this speed. 160Hz is the set-up speed. Once the machine has a needle configuration and tube in it, the working speed of the machine will be closer to 140Hz.

DESIRED FORCE – Low – Stroke Length 1/16"

I'm going to use this machine for 3 or 5 needle liners made with small working diameter needles. Those configurations will present very little resistance – so the machine should not have much force.

Machine #2
Big Configuration Liner

DESIRED SPEED – 160Hz

I have both my liners running at about the same speed – the size of the liner needle configuration doesn't make much difference to how I work, so once this machine has a tube and needle in it the working speed of the machine will be about 140Hz.

DESIRED FORCE – Medium – Stroke Length 3/32"

I'm going to use this machine for 7 needle liners made with small working diameter needles. That kind of configuration will present medium-to-low resistance so the machine will have more force than the small configuration liner.

Machine #3
Black and Grey Shader

DESIRED SPEED – 135Hz

135Hz will be the set-up speed. The working speed of this machine will be 115Hz. Machine speed is a matter of personal preference. I've found that for how I do my black and grey shading, a working speed of around 115Hz works well.

DESIRED FORCE – Medium – Stroke Length – just under 1/8"

The stroke length on this machine is longer than on the big configuration liner, but it generates about the same force. That's because the machine speed is slower. You can't just compare stroke length on one machine to another – unless all the other variables on both machines are identical. I learned to do my black and grey shading with a 7 needle mag and I still mainly use that kind of configuration to do black and grey shading. I use small diameter, short taper needles for black and grey shading. That kind of configuration presents medium resistance. So the machine doesn't have a lot of force.

Machine #4
Coloring Machine

DESIRED SPEED – 120Hz

Once this machine has a needle and tube in it, the working speed will be around 100Hz.

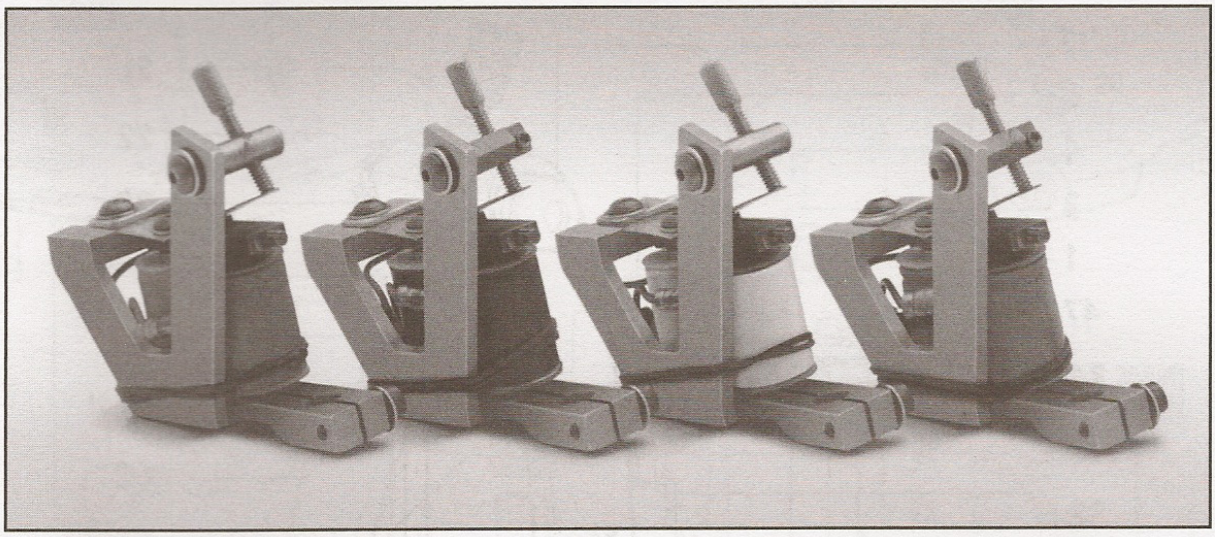
DESIRED FORCE – Medium-High – Stroke Length 1/8"

Slower machine, longer stroke length – and it's generating about the same force as the other machines, maybe just a little bit more. Most of the time I'm coloring with bigger diameter needles – always short taper so they require more force. Big diameter, short taper needles really can put in color – but if the machine doesn't have enough force, you won't be able to drive them into the skin.

The Process

- First choose a timing spring based on the desired machine speed that you've already established. The timing spring controls the machine speed. A thicker timing spring will make the machine run faster. A thinner timing spring will make the machine run slower.
- Next, you will have to put a main spring on the machine. Again you just choose one arbitrarily. If the first main spring you choose is too thin, you can replace it with a thicker main spring later.
- Once the springs and armature bar are mounted properly in the machine frame, adjust the contact point screw until the size of the air gap is approximately the size you want. This establishes the force that the machine will have. A longer stroke length will create more force.
- Pull the armature bar down to the front coil core. Slowly let the bar up until the timing spring makes contact with the contact point screw, continue to let up on the armature bar. There should be some compression on the timing spring. If there is not enough compression, replace the main spring with a thicker main spring.
- Now the machine has a timing spring chosen to establish the speed of the machine. The main spring was chosen to provide compression on the timing spring. The stroke length has been set to create the right amount of force, based on the needle configuration that will be used in that machine.
- Run the machine without a capacitor.
- Check the machine speed. If the speed is too slow, replace the timing spring with a thicker timing

Small configuration liner, big configuration liner, black and grey shader, and a coloring machine.



spring. If the speed is too fast, replace the timing spring with a thinner timing spring. Once the speed is approximately correct, install a capacitor.

- Check the machine speed. If the speed with a capacitor installed is higher than the speed was with no capacitor, replace the capacitor with a capacitor that has a higher microfarad rating. If the speed with the capacitor installed is lower than the speed was with no capacitor, replace the capacitor with a capacitor that has a smaller microfarad rating. The speed of the machine should be approximately the same with or without a capacitor.

- Once the right capacitor for your set-up has been determined, and installed, check the duty cycle of the machine. If the duty cycle is low, replace the main spring with a thicker main spring. If the duty cycle is too high, or the machine requires too much power, replace the main spring with a thinner main spring.

- Utilize the contact point screw as fine-tuning. Do not adjust the point gap so much that it will change the stroke length, unless you want to change the amount of force that the machine has. A longer stroke length creates more force. A shorter stroke length creates less force.

Required Machine Speed

Required machine speed is determined by what kind of tattooing the machine will be used for. A liner machine runs faster than a coloring machine. A machine used for black and grey shading runs at a speed somewhere between the two.

Required Machine Force

Required machine force is determined by the needle configuration being used. Configurations made up of more, or larger diameter needles present more resistance. The more resistance the needle configuration has, the more force the machine must have.

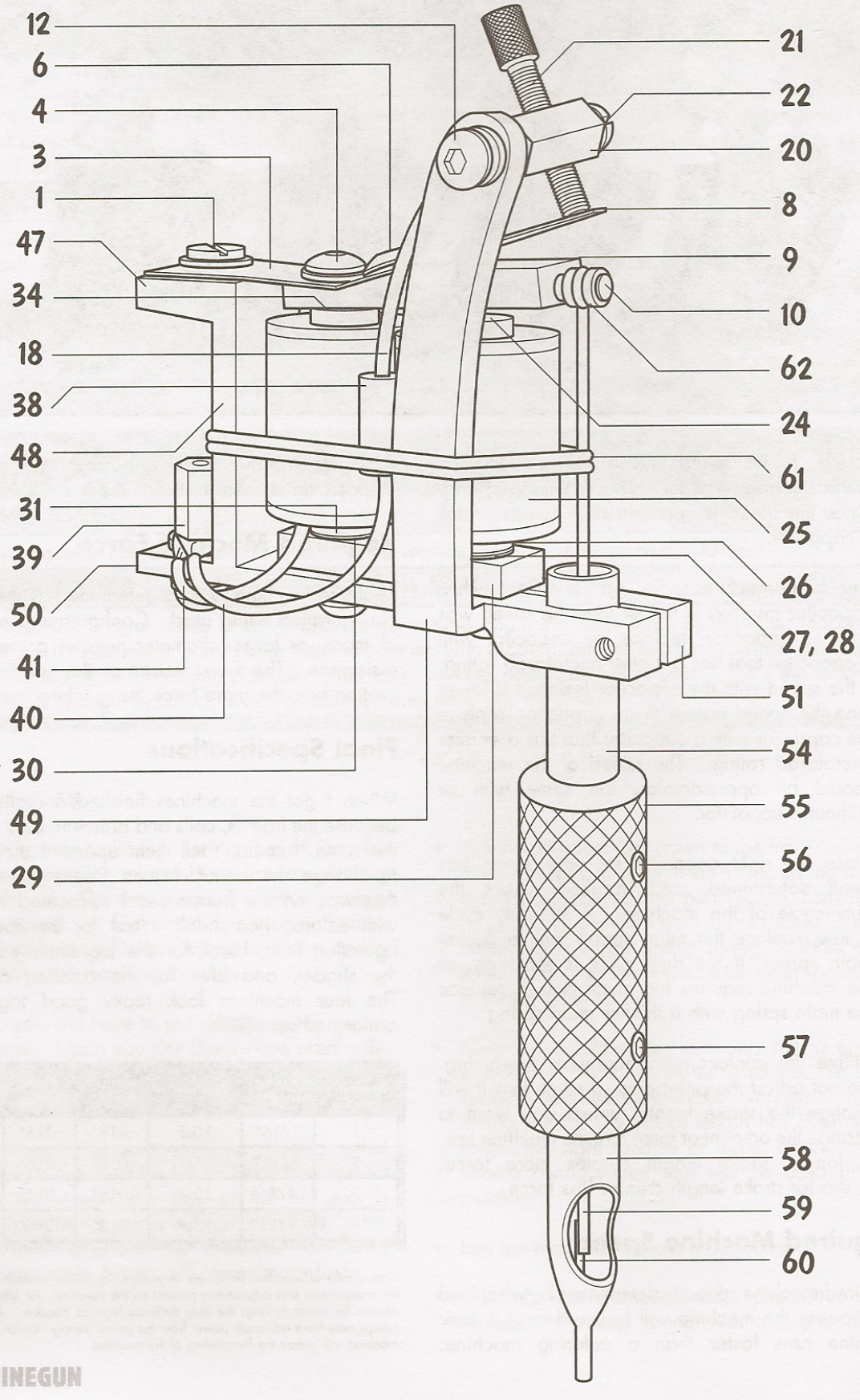
Final Specifications

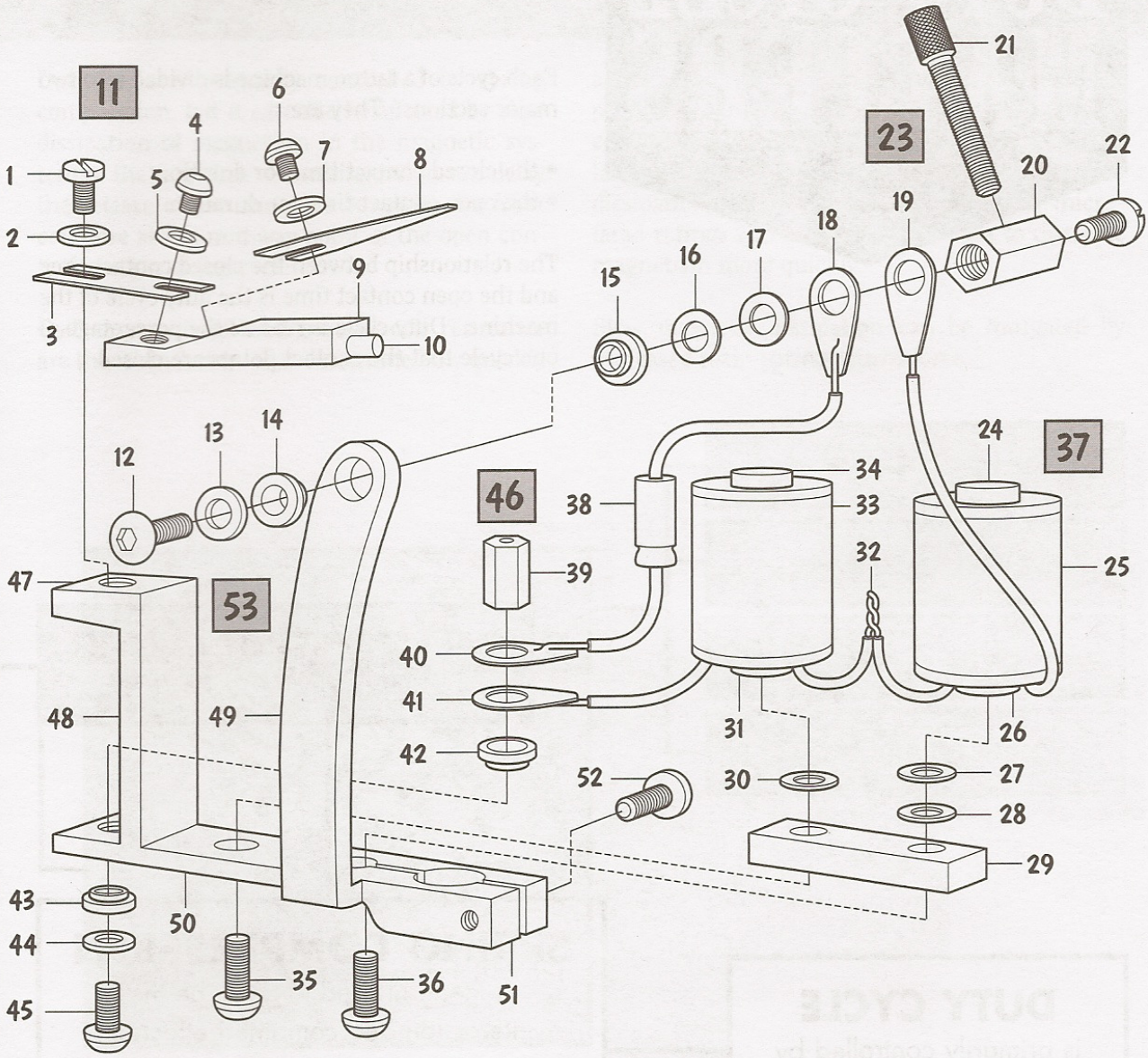
When I got the machines finished, I realized that because the frames, coils and armature bars were all the same, I couldn't tell them apart. I didn't want to change the beautiful John Deere Green paint that was on the frames, so I re-covered the coils with colored heat-shrink – red for the small configuration liner, black for the big liner, yellow for the shader, and blue for the coloring machine. The four machines look really good together – a matched set. **MGM**

Machine	Stroke Length	Capacitor	Timing Spring	Main Spring	Speed
1	1/16"	10uF	.018"	.016"	158Hz
2	3/32"	15uF	.020"	.016"	166Hz
3	1/8"	22uF	.015"	.015"	137Hz
4	1/8"	33uF	.013"	.017"	121Hz

Final results of machine set-up are dependent upon the interaction of all of the components and adjustments present on the machine. An attempt should always be made to keep the duty cycle as high as possible. All machine set-ups must have adequate power from the power supply. Under-powering a machine will impair the functioning of the machine.

Machine Part Names





1. Main Spring Mounting Screw
2. Flat Washer
3. Main Spring (Back Spring)
4. Armature Bar Screw
5. Flat Washer
6. Armature Bar Screw
7. Flat Washer
8. Timing Spring (Front Spring)
9. Armature Bar
10. Armature Bar Pin
11. **Armature Bar & Springs**
    Major Component of Mechanical System
    Component of Electrical System
    Component of Magnetic System
12. Top Binding Post Mounting Screw
13. Flat Washer
14. Insulating Shoulder Washer
15. Insulating Shoulder Washer
16. Shim Washer (not required on all set-ups)
17. Shim Washer (not required on all set-ups)
18. Capacitor Wire Lead (Negative)
19. Front Coil Wire Lead
20. Top Binding Post
21. Contact Point Screw
22. Contact Point Set Screw
23. **Top Binding Post**
    Component of Electrical System
24. Front Coil Core (Top)
25. Front Coil
26. Front Coil Core (Bottom)
27. Shim Washer (not required on all set-ups)
28. Shim Washer (not required on all set-ups)
29. Yoke (not required on all set-ups)
30. Shim Washer (not required on all set-ups)
31. Back Coil Core (Bottom)
32. Coil Connecting Leads (Soldered)
33. Back Coil
34. Back Coil Core (Top)
35. Back Coil Mounting Screw
36. Front Coil Mounting Screw
37. **Coils**
    Major Component of Magnetic System
    Component of Electrical System
38. **Capacitor**
    Major Component of Electrical System
39. Back Binding Post
40. Capacitor Wire Lead (Positive)
41. Back Coil Wire Lead
42. Insulating Shoulder Washer
43. Insulating Shoulder Washer
44. Flat Washer
45. Back Binding Post Mounting Screw
46. **Back Binding Post**
    Component of Electrical System
47. Main Spring Mount
48. Back Upright
49. Front Upright
50. Frame Base
51. Tube Vise
52. Tube Vise Screw
53. **Frame**
    Component of Mechanical System
    Possible Component of Electrical System
    Possible Component of Magnetic System
54. Tube Stem
55. Tube Grip
56. Set Screw
57. Set Screw
58. Tube Tip
59. Needle Bar
60. Needle Configuration
61. Rubber Bands
62. Grommet

WHY DUTY CYCLE MATTERS

Each cycle of a tattoo machine is divided into two major sections. They are:

- the closed contact time, or duration;
- the open contact time, or duration.

The relationship between the closed contact time and the open contact time is the duty cycle of the machine. Duty cycle is read as the percentage of one cycle that the contact points are closed.

MAIN SPRING RETURN FORCE
is made up of two factors:

SPRING COMPRESSION
is the term used to describe the interaction and combined effect of **MAIN SPRING RETURN FORCE, MAIN SPRING TENSION** and **TIMING SPRING RESISTANCE.**

DUTY CYCLE
is primarily controlled by
SPRING COMPRESSION

TIMING SPRING RESISTANCE
is established by the dimensions of the timing spring.

Duty cycle is primarily controlled by spring compression, but it can also be affected by slow dissipation of magnetism in the magnetic system of the machine. Slow dissipation can delay the release of the armature bar from the front coil core at the mid-way point of the open contact portion of the cycle.

Coil core material and over-all coil resistance are the main factors that determine how quickly a pair of coils can dissipate magnetism. The capacitor on a machine also affects how quickly the coils can dissipate magnetism. Capacitors with larger microfarad ratings will slow magnetic dissipation, while capacitors with smaller microfarad ratings will allow a pair of coils to dissipate magnetism more quickly.

Slow magnetic dissipation can be mitigated by increased main spring return force.

MAIN SPRING DIMENSIONS
are made up of four factors:

- working length of the spring
- width of the spring
- consideration of spring taper
- thickness of the spring

MAIN SPRING ANGLE OF DEFLECTION
can only be measured without a timing spring on the machine. Angle of deflection is measured as the distance between the top surface of the front coil core and the bottom surface of the armature bar, when there is no timing spring mounted on the machine.

MAIN SPRING TENSION
is measured as the difference between the size of the angle of deflection gap and the size of the air gap, once the machine is set up. The greater the difference, the greater the main spring tension.

TIMING SPRING DIMENSIONS
are made up of four factors:

- working length of the spring
- width of the spring
- consideration of spring taper
- thickness of the spring

Individual measurements or calculations of spring compression, magnetic dissipation and stroke length cannot provide information about the combined and interactive effect those factors have on machine function. A duty cycle reading provides a final measurement that includes all of the interacting factors of a machine set-up. A duty cycle reading also provides an insight into the duration of each of the two halves of one cycle of a running tattoo machine.

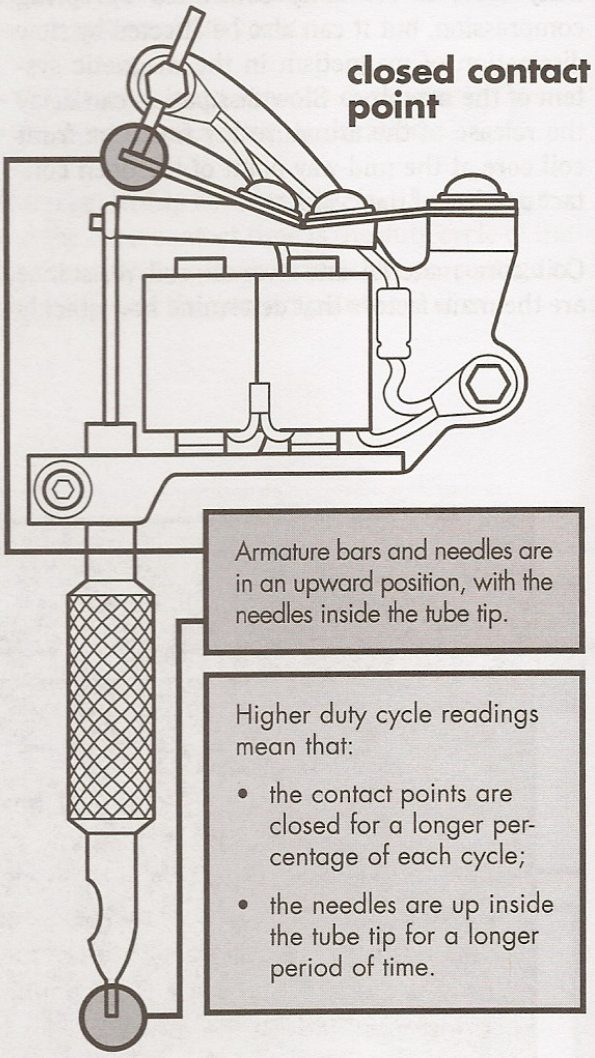
The information from the contact points that provides a duty cycle reading also tells us where the armature bar and needles are. Closed contact points mean that the armature bar and needles are in an upward position. Open contact points mean that the armature bar and needles are in a downward position.

If a machine has a duty cycle reading of 50%, that means half of the time the contact points are closed and half of the time they are open. That also means that half of the time, the needles are up inside the tube tip, and half of the time the needles are moving downward, completely sticking out of the tube tip, or moving upward.

If a machine has a higher duty cycle reading, the contact points are closed for a longer percentage of each cycle. Closed contact points mean the armature bar and needles are in an upward position. Higher duty cycle readings mean the needles are up inside the tube tip for a longer period of time than the needles are sticking out of the tube tip.

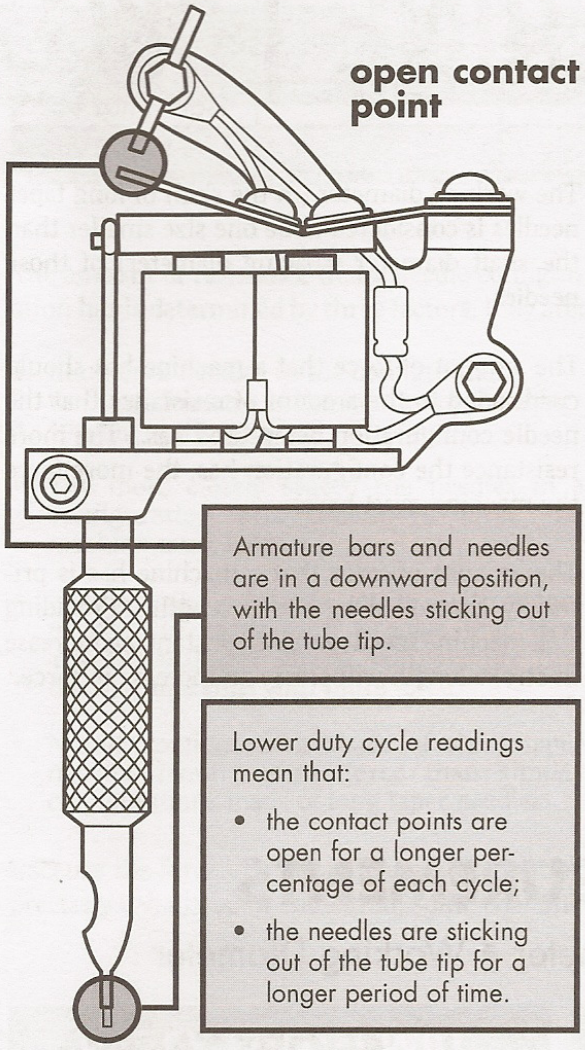
Machine speed, not duty cycle, determines machine usage. Providing that the machine speed is correct, higher duty cycle readings will not affect the use of the machine.

The cycle of a machine is not always symmetrical in nature. The downward motion of the armature bar and needles is separate from their upward motion. One part of the cycle may occur faster than the other.


closed contact point
Armature bars and needles are in an upward position, with the needles inside the tube tip.
Higher duty cycle readings mean that:
• the contact points are closed for a longer percentage of each cycle;
• the needles are up inside the tube tip for a longer period of time.

At the top of the cycle, when the contact points are closed, the motion of the armature bar and needles changes direction from upward to downward. Higher duty cycle readings indicate that this transition from upward to downward occurs slowly, providing a sort of top-end hang time. This does not impair machine function because the needles are in an upward position, inside the tube tip, so they will not drag in the skin while the tube and machine is being moved during the tattooing process.

Low duty cycle readings indicate that the needles are sticking out of the tube tip for a longer period of time than the needles are up inside the tube tip. If magnetic dissipation is slow or spring compres-


open contact point
Armature bars and needles are in a downward position, with the needles sticking out of the tube tip.
Lower duty cycle readings mean that:
• the contact points are open for a longer percentage of each cycle;
• the needles are sticking out of the tube tip for a longer period of time.

sion is too low, the transition from downward motion to upward motion may be slow, or even stopped momentarily, leaving the needles sticking out of the tube tip, where they can adversely affect the tattooing process by dragging in the skin.

An ideal machine set-up would provide a controlled cycle in which the armature bar and needles move downward quickly and change direction upward quickly. Any slowing or adjusting of the cycle to control machine speed should occur at the top end of the cycle. This type of machine set-up will result in high duty cycle readings, not to extend closed contact time, but to control the position of the needles during the tattooing process. **MGM**

THE MOST COMMON DUTY CYCLE MISTAKE

The most common duty cycle mistake that tattoo artists and machine builders make when setting up machines is believing that low duty cycle readings are O.K. Duty cycle readings for all machines should be relatively high. Readings of fifty percent are adequate, but as stroke length increases, it becomes difficult to maintain higher duty cycle readings.

2 THINGS TO REMEMBER:

- Duty cycle is NOT force
- Duty cycle should NEVER be under 40%

2 WAYS TO INSTANTLY IMPROVE (RAISE) DUTY CYCLE

- Put a smaller capacitor on the machine. Big capacitors slow magnetic dissipation.
- Increase spring compression on the machine. Never assume that 0.018" springs will always work. Utilize springs of varying thicknesses to get a proper balance between the timing spring and the main spring.

NEEDLES AND MACHINE FORCE

How much force your tattoo machine should have is dependent upon the needle configuration you will use in that machine. Needle configurations and machine force should always be considered together.

Needles for tattooing generally fall into two categories: long taper or short taper. To understand the difference between long taper and short taper needles, you have to consider the diameter of the needles in the skin. The diameter of the needles in the skin is also referred to as the working diameter of the needles.

The working diameter (in the skin) of short taper needles is considered to be the same as the shaft diameter (spacing diameter) of those needles.

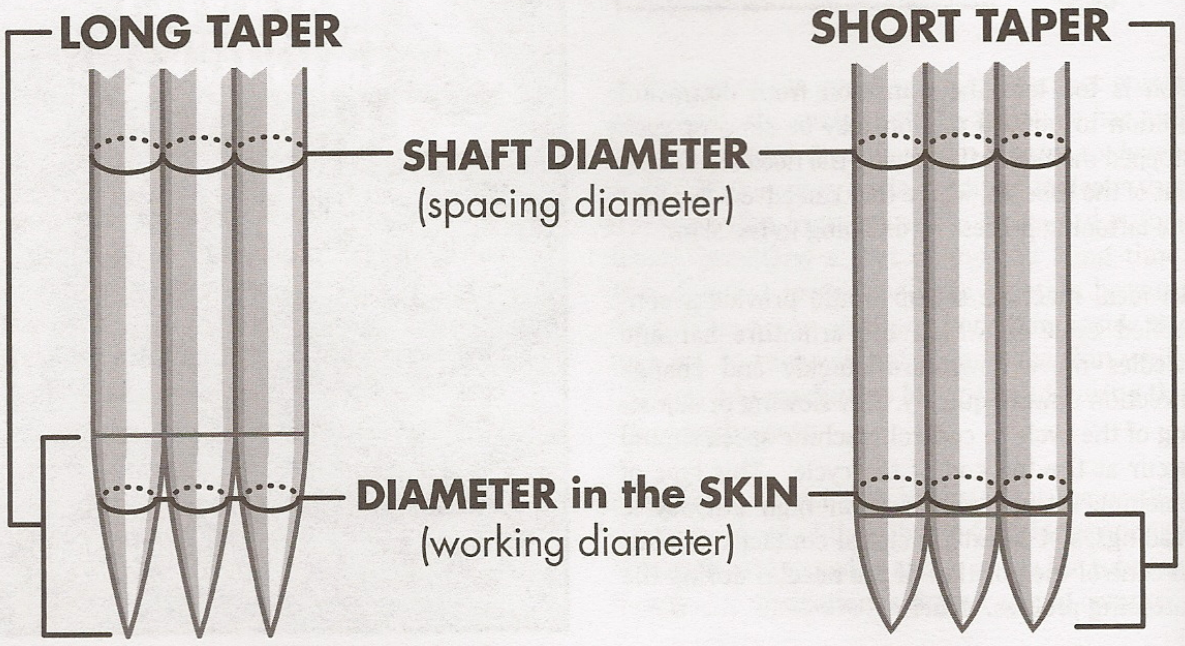
The working diameter (in the skin) of long taper needles is considered to be one size smaller than the shaft diameter (spacing diameter) of those needles.

The amount of force that a machine has should correspond to the amount of resistance that the needle configuration being used has. The more resistance the configuration has, the more force the machine must have.

The amount of force that a machine has is primarily controlled by stroke length. Providing that machine speed remains constant, an increase in stroke length will create an increase in force.

NEEDLE MEASUREMENTS

Length of Taper • Shaft Diameter • Working Diameter



Needle	Shaft Diameter (Spacing Diameter)	Diameter in the Skin (Working Diameter)
.30 Short Taper	.30	.30
.33 Short Taper	.33	.33
.36 Short Taper	.36	.36
.30 Long Taper	.30	.27
.33 Long Taper	.33	.30
.36 Long Taper	.36	.33

The amount of resistance that a needle configuration has is determined by three factors, they are:

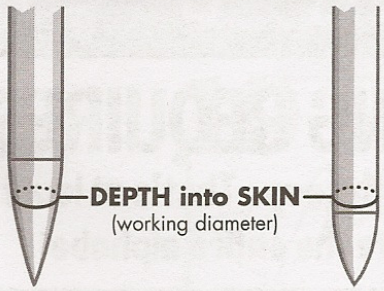
1. number of needles in the configuration;
2. working diameter of the needles in the skin;
3. spacing of the needles.

- The more closely spaced the needles in a configuration are, the more force the machine must have.
- Needle configurations made with more needles, or made with needles that have a larger diameter in the skin, require that the machine runs with more force.
- Needle configurations made of short taper needles require more force than similar configurations made of long taper needles.

Because the force of a tattoo machine cannot be precisely calculated or measured, some trial and error will always be necessary when determining how much force is needed to overcome the resistance of a needle configuration.

Every needle configuration presents a certain amount of resistance. Every machine set-up creates a certain amount of force. If a machine does not have enough force, that can only mean it does not have enough force to drive the needle configuration you want it to. It does not mean there is anything wrong with the machine or the needle configuration. To work properly, the machine must have enough force to overcome the resistance of the needle configuration. MGM

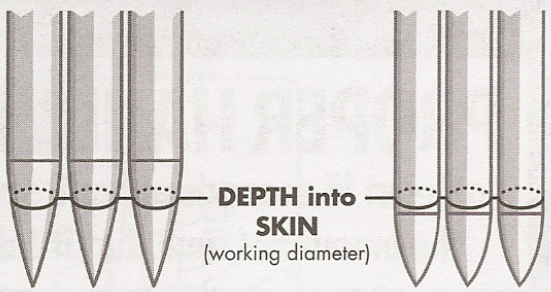
WHICH NEEDLE WILL REQUIRE MORE FORCE?



Big Diameter Long Taper | **Small Diameter Short Taper**

IF THE WORKING DIAMETER IS THE SAME:
- these two needles require the SAME force.
- they present equal resistance.

WHICH NEEDLE GROUPING WILL REQUIRE MORE FORCE?



This grouping requires less force | **This grouping requires more force**

Although the resistance of each needle is equal, the resistance of each grouping is different. The more closely-spaced the needles in a configuration are, the more force the machine must have.

HANDWASHING

is one of the simplest and most important means of preventing cross-contamination in a tattoo shop.

PROPER HANDWASHING REQUIRES

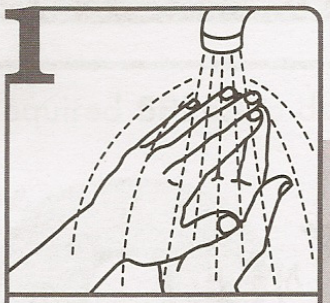
at least 15 seconds of hand scrubbing with soap. That's at least the amount of time that it takes to recite the entire alphabet.

TATTOO ARTISTS SHOULD WASH THEIR HANDS OFTEN AND PROPERLY

HANDWASHING

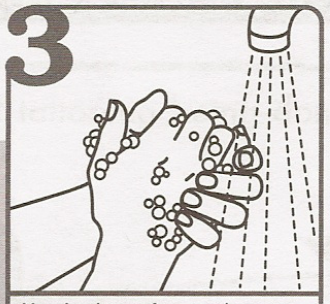
PROCEDURE FOR

TATTOOING & PIERCING

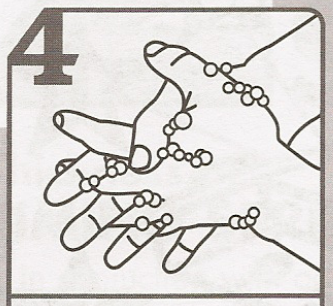


1. Wet hands and wrists with warm running water.

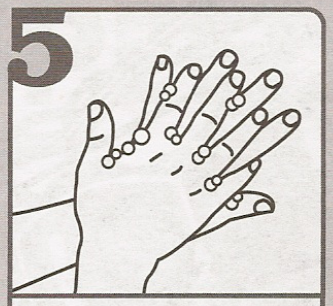
2. Apply a sufficient amount of soap to open palms.



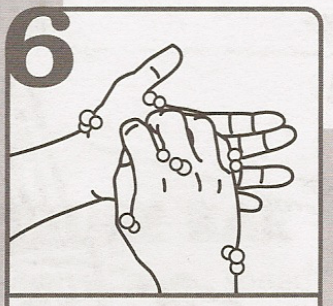
3. Move hands away from running water. Lather soap and scrub hands well, palm to palm.



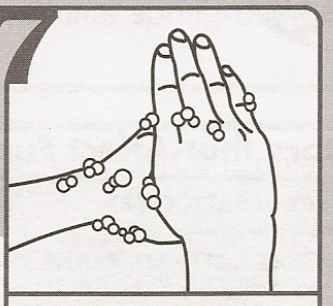
4. Wash hands well for about 20 seconds. Scrub in between and around fingers.



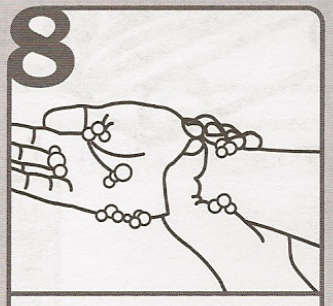
5. Scrub back of each hand with palm of other hand.



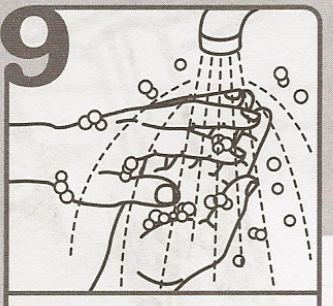
6. Scrub fingertips of each hand in opposite palm.



7. Scrub each thumb clasped in opposite hand.

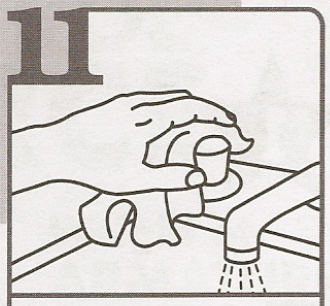


8. Scrub each wrist clasped in opposite hand.



9. Rinse thoroughly under running water.

10. Wipe and dry hands well with paper towel.



11. Turn off water with paper towel.

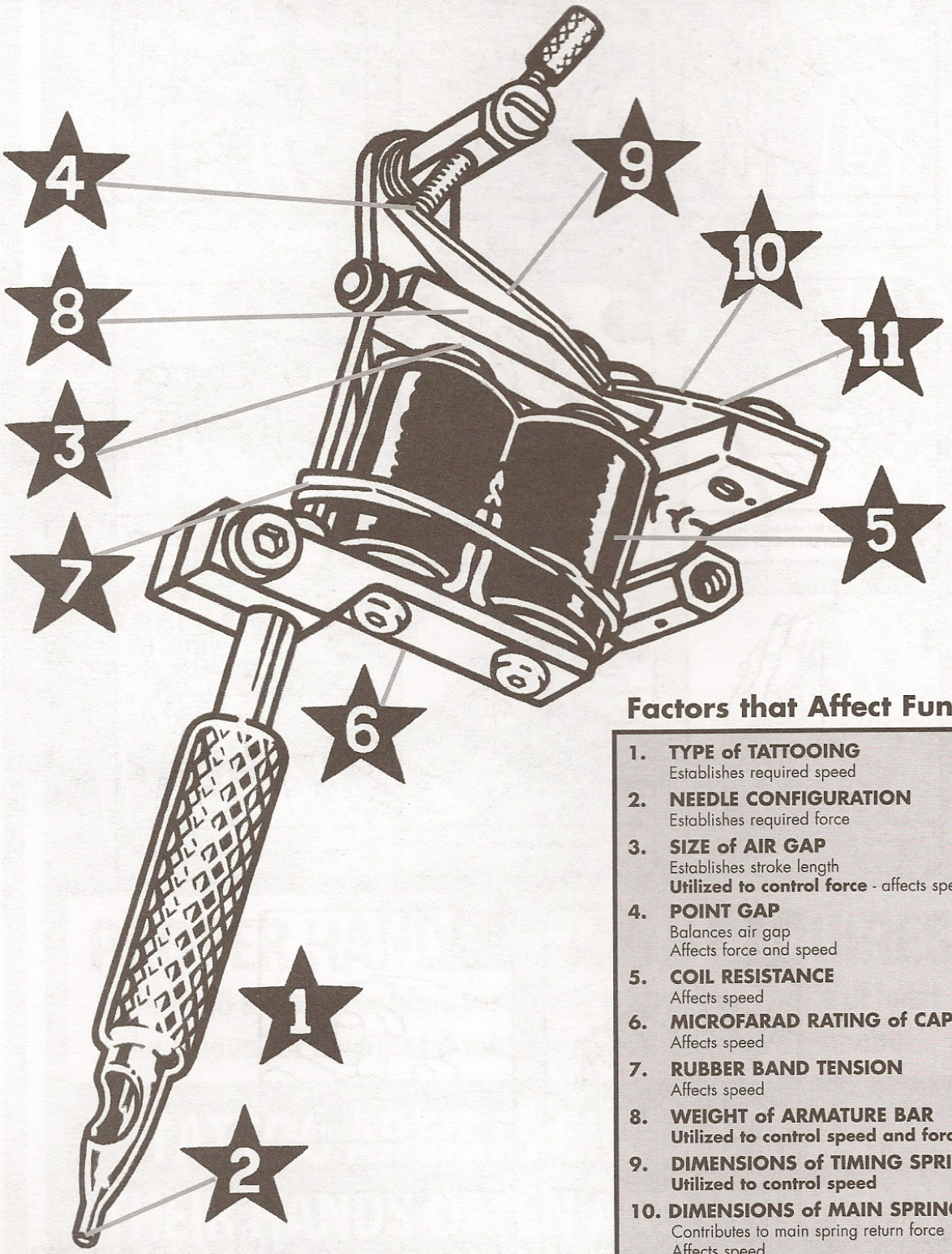
Protect your livelihood! Your health and the health of your customers is in your hands.

For more information about cross-contamination control and handwashing products, go to: www.eikondevice.com

EIKON DEVICE

TATTOO MACHINE

FUNCTION



Factors that Affect Function

1. **TYPE of TATTOOING**
   Establishes required speed
2. **NEEDLE CONFIGURATION**
   Establishes required force
3. **SIZE of AIR GAP**
   Establishes stroke length
   Utilized to control force - affects speed
4. **POINT GAP**
   Balances air gap
   Affects force and speed
5. **COIL RESISTANCE**
   Affects speed
6. **MICROFARAD RATING of CAPACITOR**
   Affects speed
7. **RUBBER BAND TENSION**
   Affects speed
8. **WEIGHT of ARMATURE BAR**
   Utilized to control speed and force
9. **DIMENSIONS of TIMING SPRING**
   Utilized to control speed
10. **DIMENSIONS of MAIN SPRING**
    Contributes to main spring return force
    Affects speed
11. **MAIN SPRING ANGLE of DEFLECTION**
    Contributes to main spring return force
    Affects speed

MACHINE FUNCTION

is described by two factors:

MACHINE SPEED & MACHINE FORCE.

Required **SPEED** is determined by the type of tattooing being done.

the 2 things that CONTROL SPEED

Thickness of
TIMING SPRING

- In conjuction with adequate main spring return force; thicker spring increases speed, thinner spring decreases speed.

Weight of
ARMATURE BAR

- Lighter bar increases speed
- Heavier bar decreases speed

Required **FORCE** is determined by the resistance of the needle configuration.

the 2 things that CONTROL FORCE

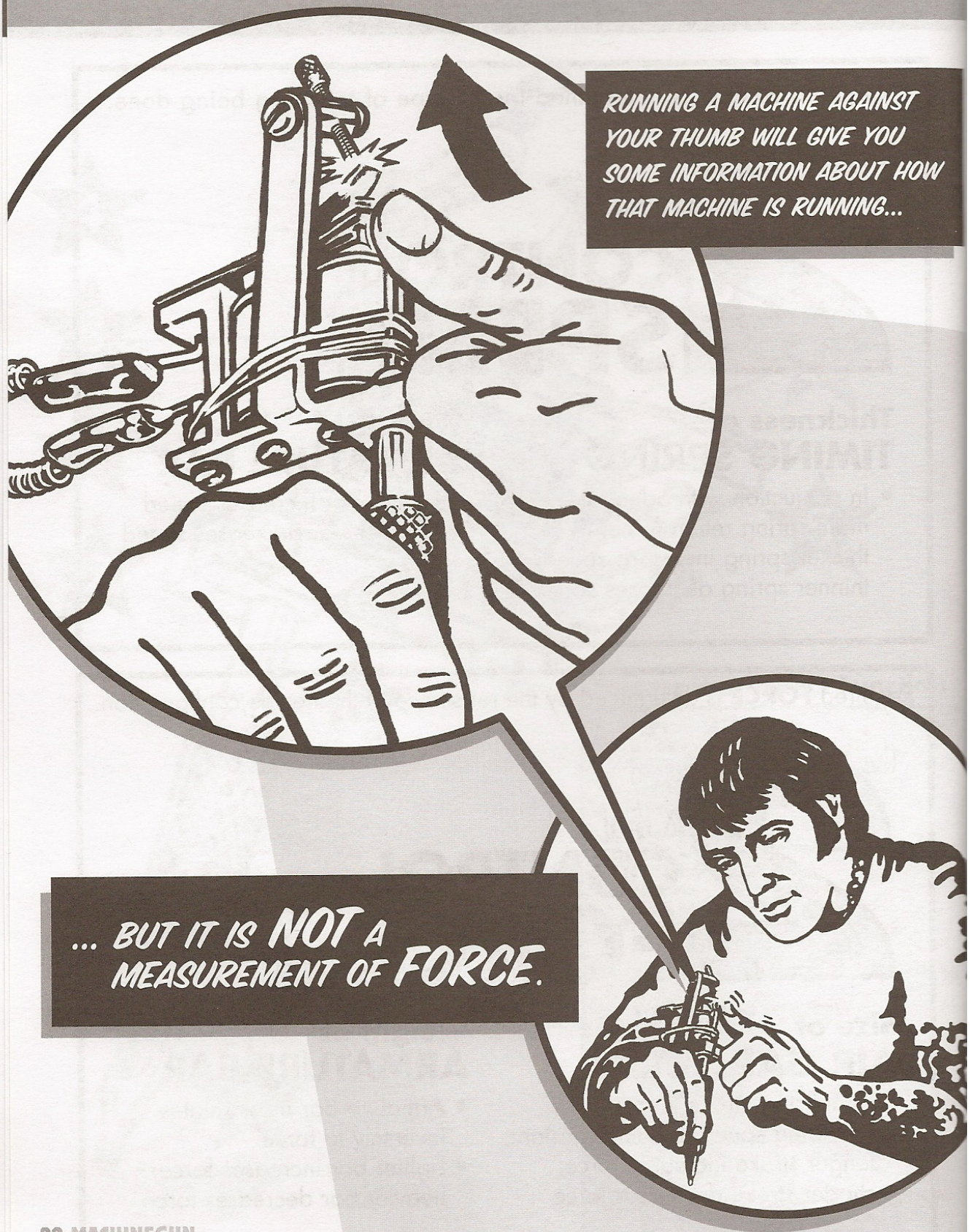
Size of
AIR GAP

- Establishes stroke length
- Providing speed remains constant; longer stroke increases force, shorter stroke decreases force

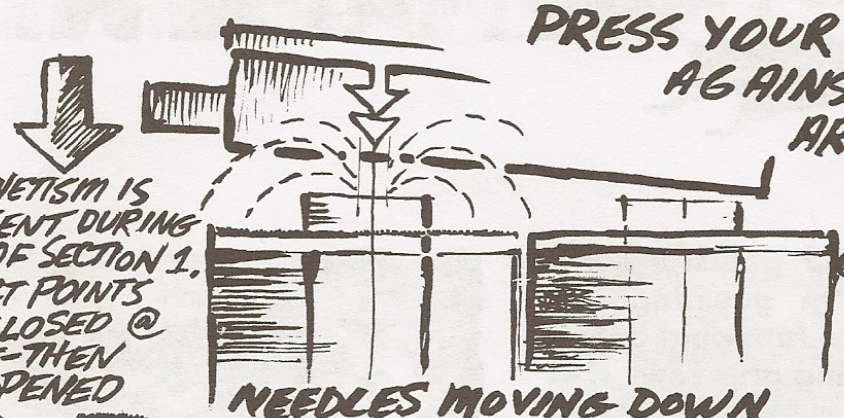
Weight of
ARMATURE BAR

- Armature bar mass relates inversely to force
- Lighter bar increases force; heavier bar decreases force

This is NOT FORCE


RUNNING A MACHINE AGAINST YOUR THUMB WILL GIVE YOU SOME INFORMATION ABOUT HOW THAT MACHINE IS RUNNING...
... BUT IT IS NOT A MEASUREMENT OF FORCE.

3 SECTIONS EACH SECTION CONTRIBUTES TO THE INFORMATION YOU GET WHEN YOU PRESS YOUR THUMB AGAINST THE ARMATURE BAR.



MAGNETISM IS PRESENT DURING ALL OF SECTION 1. CONTACT POINTS ARE CLOSED @ START - THEN OPENED

NEEDLES MOVING DOWN

SECTION 1 YOU FEEL THE ACTUAL FORCE OF THE MACHINE

(1) Bar is MOVING DOWN

MAGNETISM IS PRESENT BUT DISSIPATING DURING ALL OF SECTION 2

CONTACT POINTS ARE OPEN

SECTION 2 IF YOU ARE PUSHING UP ON THE ARMATURE BAR - THIS SECTION OF THE CYCLE WILL FEEL LIKE FORCE - BUT IT IS NOT!

(2) Bar is STUCK & NOT MOVING

NEEDLES ARE STICKING OUT & NOT MOVING.

SECTION 3 YOU WILL FEEL NO FORCE DURING THIS SECTION OF THE CYCLE - THE BAR IS MOVING UP - AND YOU ARE PUTTING PRESSURE UPWARDS -

MAGNETISM IS PRESENT AT END OF SECTION 3 - CONTACT POINTS ARE OPEN @ START - THEN CLOSED.

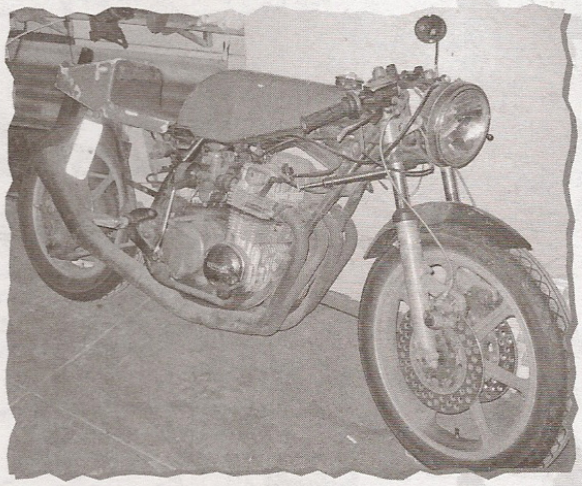
NEEDLES MOVING UP

(3) Bar is MOVING UP

IF ONE SECTION OF THE CYCLE IS LONGER THAN THE OTHERS THE MACHINE WILL SEEM STRONGER OR WEAKER THAN IT IS.

Bill: How did you get started in this? I mean, I'm guessing you were connected to tattooing before you started making grip covers.

Malia (pronounced like Maria): Well what happened was, I was working with these materials and a co-worker was tattooing on the side. That's how the product actually became developed and I was getting tattooed by Marcus Pacheco at the time so I would just go ahead and make some up for him, and bring them to him when I got tattooed. His friends would see them and guys visiting would see them and he'd pass my name onto them. Then I would get random phone calls from tattoo artists wanting to buy grip covers from me.



Malia's 1974 Honda CB 550 motorcycle.

What year would that have been?

About 1996.

Marcus was probably tattooing a lot of tattoo artists at that time. That was probably the best exposure you could have got.

He was at Primal Urge then. Grimey was there, and there were a lot of guys coming in and out of the shop.

At that time, I guess they just knew you as Malia who was getting tattooed and made theses grip covers. When did the company name come about?

GRIP COVERS

Years later. The name is kind of weird – it really doesn't have much to do with anything – it's named after one of my motorcycles.

Do you still have the motorcycle?

I still have it. It's beat-up. It was raced in the seventies, it's got this custom fiberglass tank and barely a seat. It's held together by practically nothing, some duct tape and wire.

And that's where the rat part comes from, is the bike red?

It is red.

What kind of racing was the bike built for?

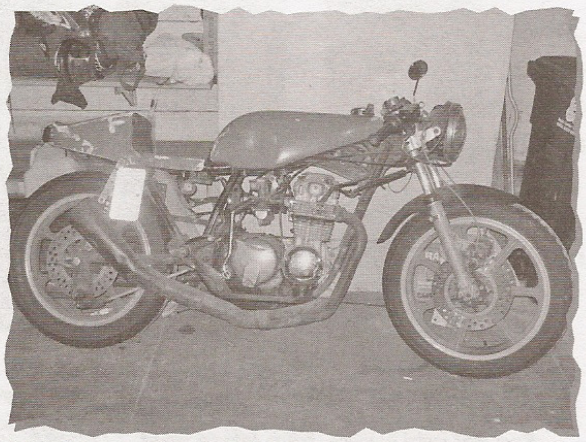
It was a street racer. It's a '74 Honda CB 550 that's just been ripped to shreds.

You still drive it?

Yeah, that bike is still going strong.

Do you go to conventions?

I do, and I have a few people that go to conventions for me. I'm not the hard-sell type, I'm not a salesman. I would rather sit around and answer people's questions and let the product speak for itself. I get to meet a lot of great people, and that's the fun part about conventions, it's not so much about selling product.



Malia's 1974 Honda CB 550 motorcycle.

How many different sizes and lengths of grip covers do you make?

They're all the same length and there's five different grip sizes that we make covers for.

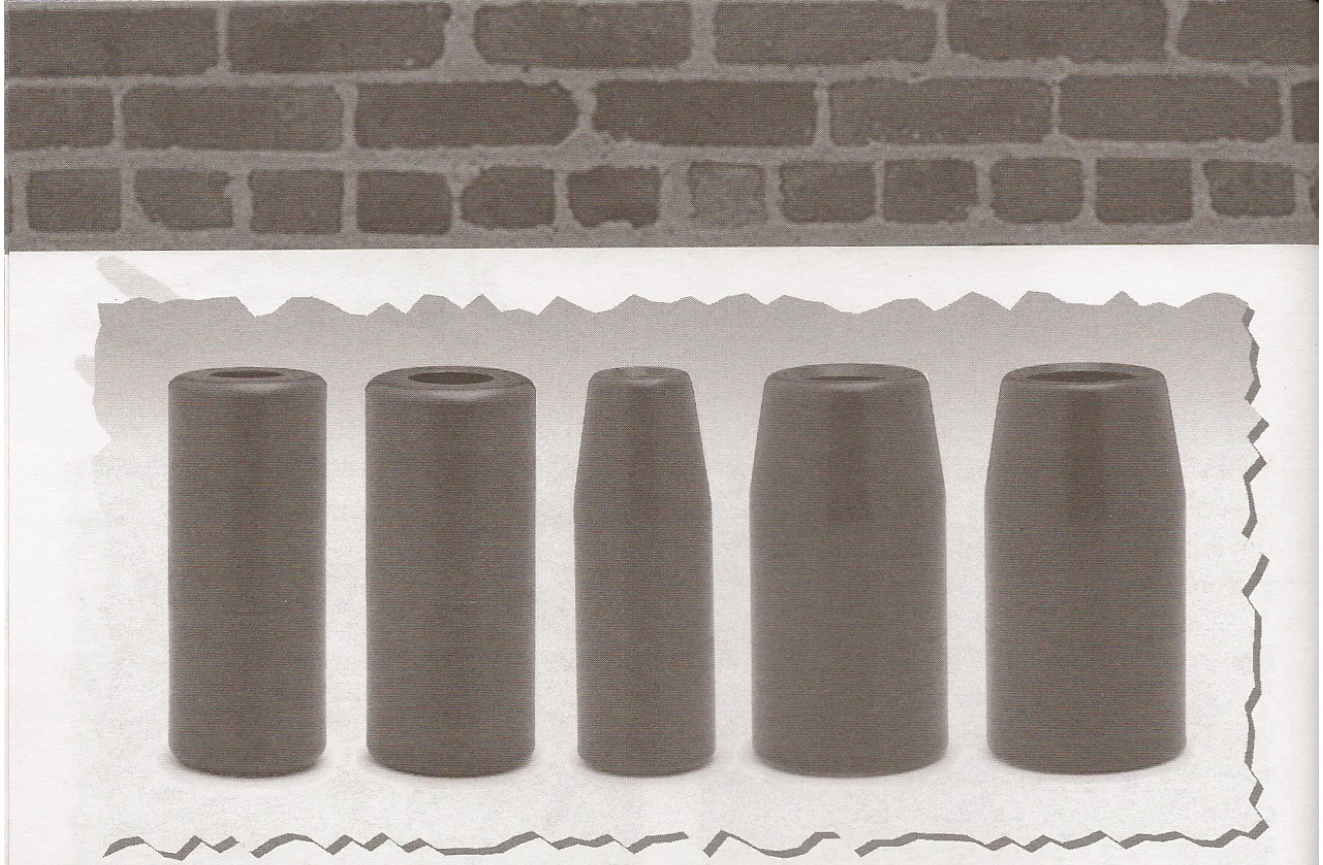
So there are five different internal diameters, but the grip covers are all about the same thickness.

Yes, the wall thickness is the same on all of the grip covers, it's a little less than a quarter of an inch. There's a straight version and we have a tapered point.

Are they all that industrial, blackish-grey color?

So far, yes. We will be expanding out to colors at some point.

When you first started you weren't taking a product that already existed and improving it... you had to



Red Rat grip covers, from left to right: 5/8" standard, 3/4" standard, 1/2" taper, 7/8" taper, and 1" taper.

develop it completely. Did you hit it right on at the start, or did you have to go through a few different things with material and diameters and everything else to get the product the way it is now?

Absolutely, it's been an ongoing project since the beginning. In 2003 Marcus wrote an article about the grip covers – that's what made me stop and re-do everything. I started getting phone calls and phone calls and phone calls. The process I had was fine, but it just wasn't as good as it could have been. The grips were cut to approximate lengths. The product just didn't look as good as I wanted it to. So at that point I re-did the entire manufacturing process.

So up until then, growth had been gradual, but there was a big jump in sales when that article appeared?

Yes, before that it really was more of a hobby than anything. After that I realized that maybe I needed to put more effort into it.

It seems like your success has been predominately driven by word of mouth. What do you think it is that tattoo artists like about the product?

Everyone is going to be different. I've had some people say that they don't like the covers – they don't like the way they feel. Then there's other guys who say they've used the product for two months and all of a sudden they can feel their fingertips, when they couldn't before. I don't like to make those claims because everyone is going to be different and have their own style and method of working. There are so many factors that can make or break the product.

I would imagine there's a difference from tattoo artist to tattoo artist even in the way they use the grip covers.

Some guys cut these down to a length of about an inch and a half. Some guys will use a size bigger to fit their grips, so it can slide on and off a lot easier. Some

guys will take the taper point and turn it around the other way.

How long will a grip cover last before it needs to be replaced?

It depends on what kind of beating it takes, like how often it's in the rotation, how often it's autoclaved. Normally they last anywhere between six months to a couple of years.

How can you tell when a cover needs to be replaced?

Usually what happens is it will tear off of the tube. Once it tears, it will fall off the tube.

Some people find the grip covers are really difficult to get on and off, especially when they're new.

A little bit of liquid soap applied to the inside of the grip cover will help. Sometimes just warming them up under hot water will do it. Liquid soap is good because it helps the grip cover slide on and then it dries a bit and then when you want it to come off you just get a little water under there and it will slide right off.

What do you recommend for cleaning?

Whatever you want to do is going to work. The only thing I wouldn't recommend is concentrated green soap. Don't let them sit in green soap... it's too harsh. Everything else is going to be fine.

You wouldn't want to scrub them with a stiff brush, though.

You don't need to at all. Ultrasonic cleaning and then autoclaving is fine.

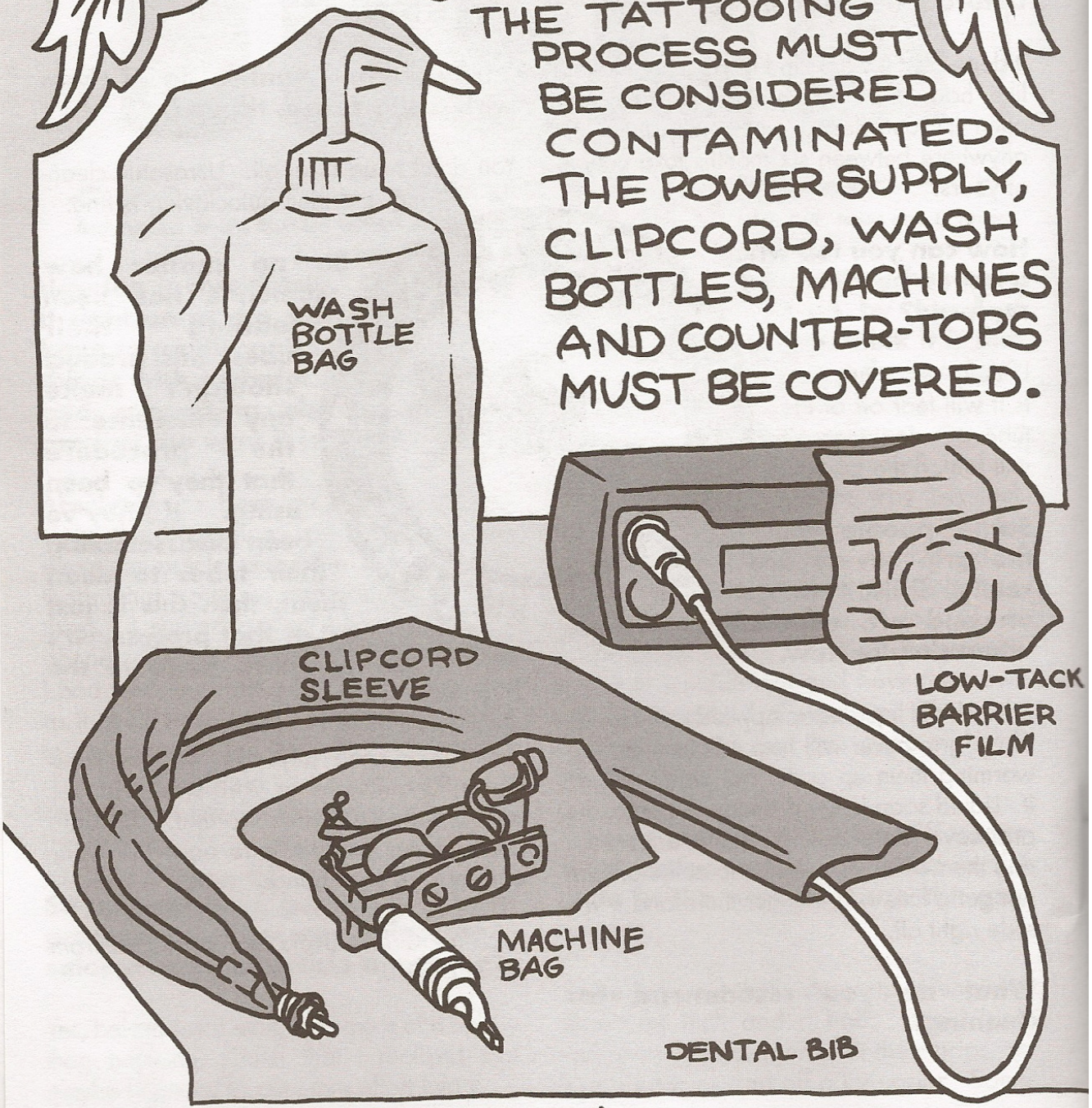
So no matter how someone has been cleaning their tubes, this product shouldn't make any difference to the procedure that they've been using. If they've been disassembling their tubes to clean them, then this is just part of that process. It's just an extra piece to the five-piece tube.

Yes. Some shop guys get frustrated because it's a little bit of extra work, but for a lot of tattoo artists it's worth it. The main point of the product is to ease the wear and tear on your hands. **MGM**

Red Rat Grip Covers are available from Eikon Device.

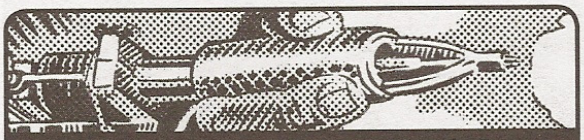
DISPOSABLE SURFACE BARRIERS

ANYTHING THAT IS TOUCHED DURING THE TATTOOING PROCESS MUST BE CONSIDERED CONTAMINATED. THE POWER SUPPLY, CLIPCORD, WASH BOTTLES, MACHINES AND COUNTER-TOPS MUST BE COVERED.



www.eikondevice.com

READERS' MACHINES

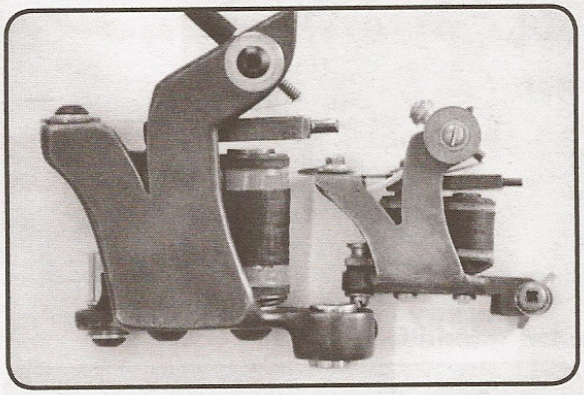


METAMORPHIC TATTOO

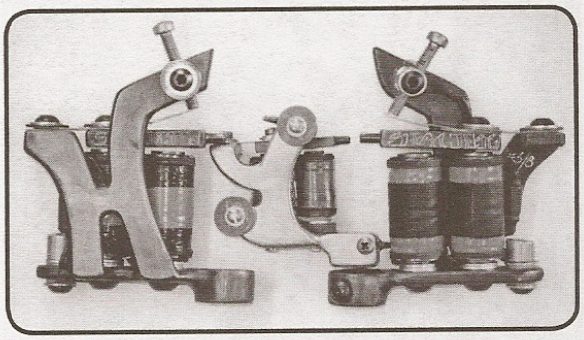
Andy Johnson from Metamorphic Tattoos (home of the World's Greatest one piece tubes) is at it again with a new series of big machines... really big.

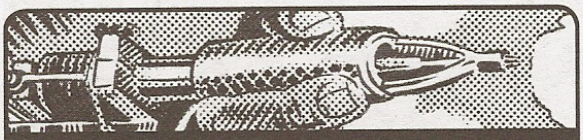
Get the low-down on the big ones, the regular-sized ones and his tubes at:
www.metamorphictattoos.com

Metamorphic Tattoo
515 S. Bascom Ave.
San Jose, CA
95128
phone: 408-920-9787



Believe it or not, the small-looking machines in the photos above and below are actually regular-sized machines.

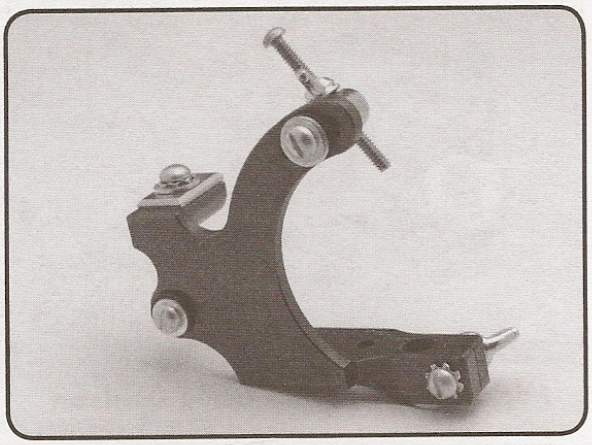




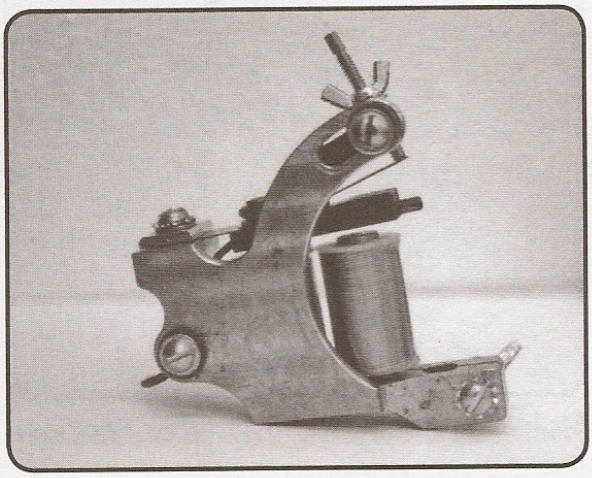
LEFTY'S TATTOO

There's a lot of Supreme-style frames out there, but nobody has put as much effort into getting them right as Paul and Lefty at Lefty's Tattoo in Chula Vista, California. These really are even better than the original Supremes.

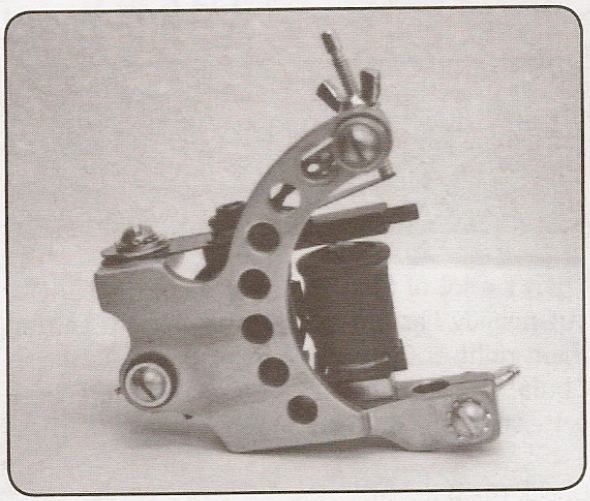
Check them out at:
Lefty's Tattoo
283 Broadway
Chula Vista, CA
91910-2319
phone: 619-585-8122



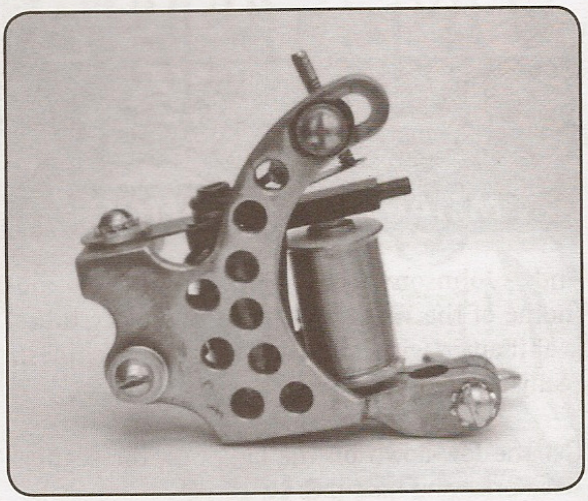
This is the frame they're making at Lefty's. They sell the machines completely set up and ready to use.



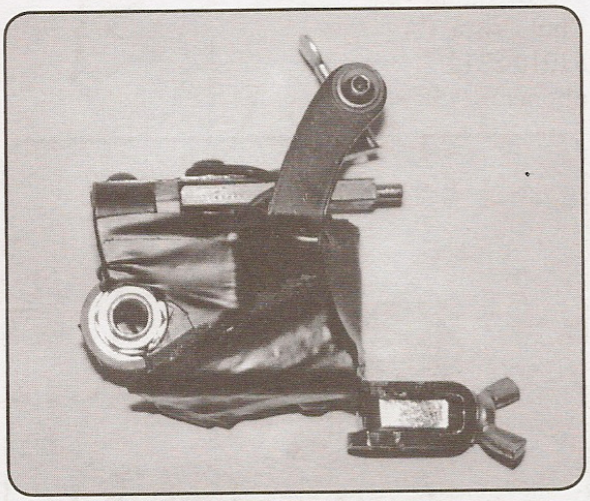
READERS' MACHINES



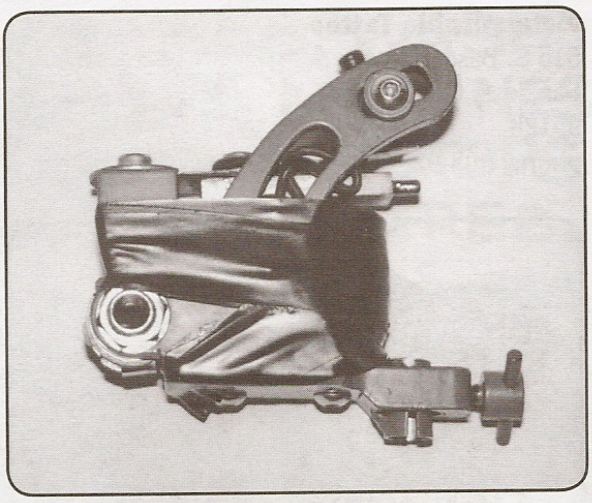
Lefty's Brass Shader from Dan O'Brien



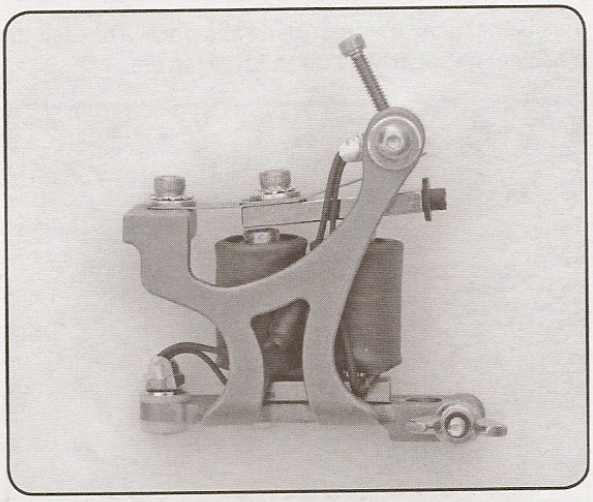
Lefty's Liner from Dan O'Brien



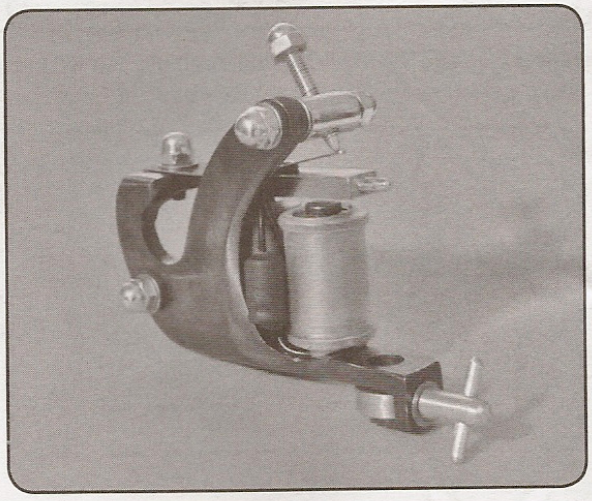
Micky Sharpz from Dave Coulson



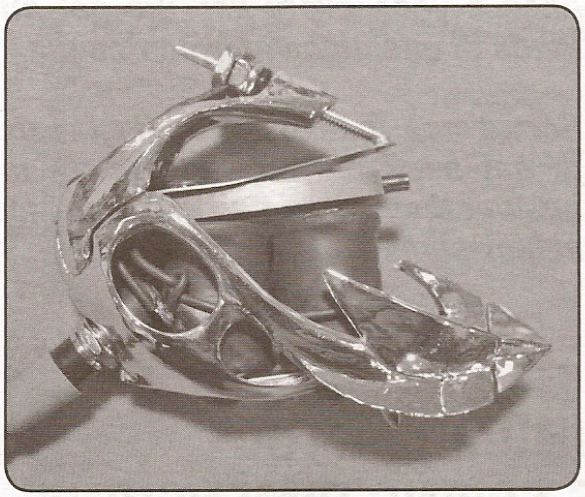
Mickey B from Dave Coulson



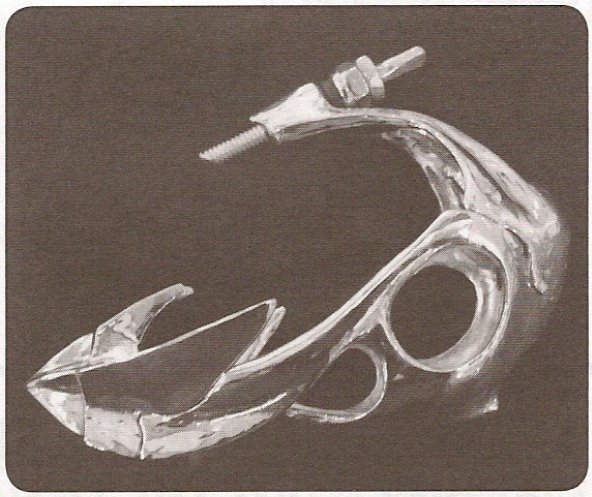
Stainless Steel Matthews from Peerless



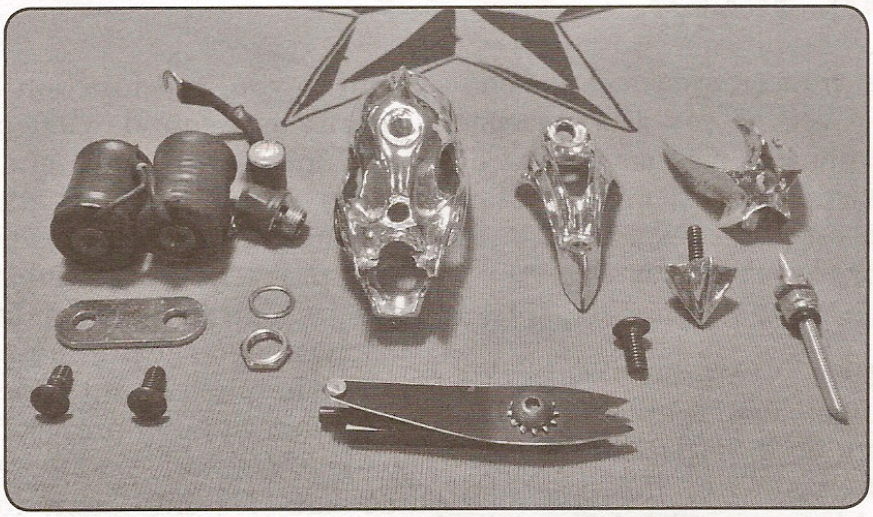
AZA



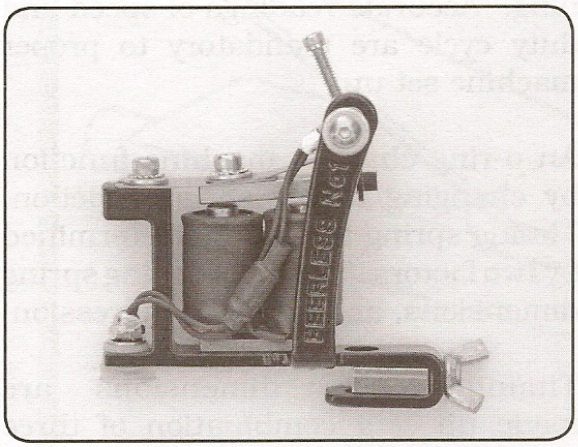
Wilhelm Scherer Custom Machine



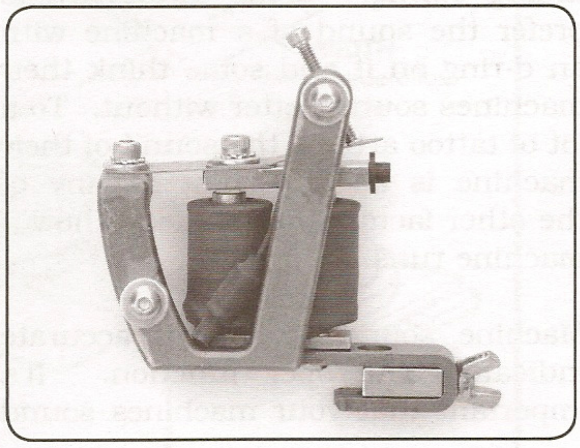
Wilhelm Scherer Custom Frame



Wilhelm Scherer Custom Parts



Peerless #1



Waters Stainless Steel from Peerless

Even though we only get an issue out once a year, every day we get all kinds of questions at Machinegun.

Sometimes it takes a while for us to get back to you, but we try to answer them all. Email questions to: submissions@machinegun.com

O-RINGS CHANGE THE SOUND OF TATTOO MACHINES BUT THE TIMING SPRING DIMENSIONS CONTROL SPEED.

Q. I loved your report on springs and armature bars. I noticed you didn't mention o-rings. Do you feel they aren't needed? I know it sounds lame but every machine I've ever puchased assembled was set up with one. Why do you think this is?

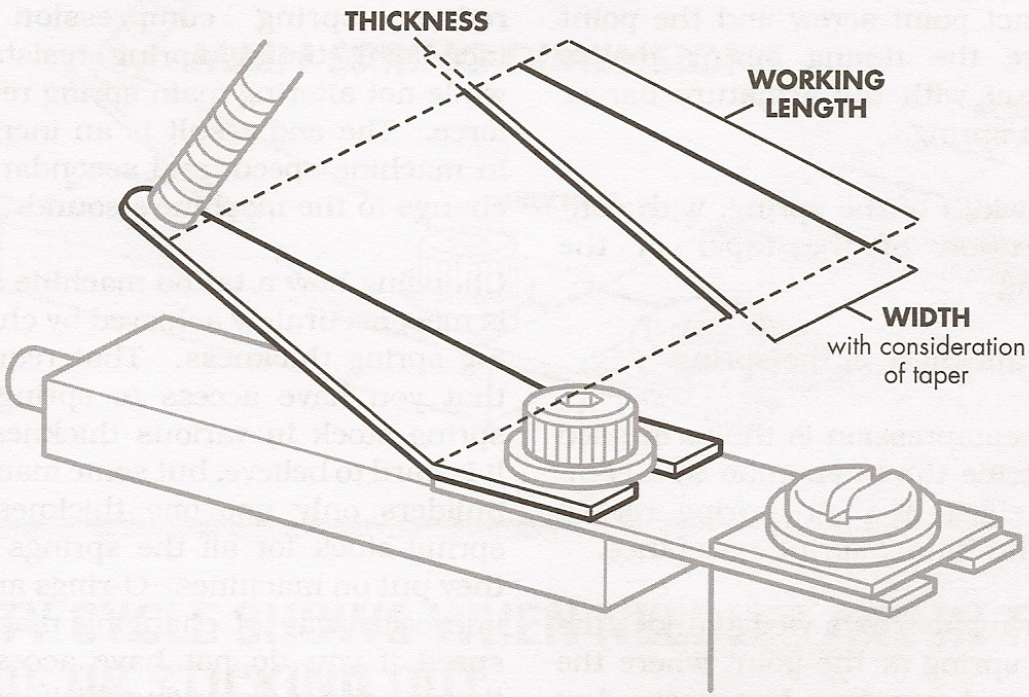
A. Putting an o-ring on the timing spring changes two things: it alters the function of the machine and it changes the sound of the machine. Tattoo machines sound a bit quieter and softer with an o-ring on the timing spring. Some tattoo artists prefer the sound of a machine with an o-ring on it and some think their machines sound better without. To a lot of tattoo artists, the sound of their machine is as important as any of the other factors that make up how a machine runs.

Machine sound is not an accurate indicator of proper function. It's important that your machines sound right to you, but function has to take priority over sound. Generally when a machine is running right, it sounds pretty nice. A really erratic, rough sounding machine probably isn't running properly. At a certain point you have to accept the sound of your machine, you can't keep trying to make it quieter and quieter. Once you start to forgo proper function for a more pleasant sound, you've gone too far. It's important to note that the sound of a machine will only tell you roughly how that machine is running. Accurate readings of speed and duty cycle are mandatory to proper machine set up.

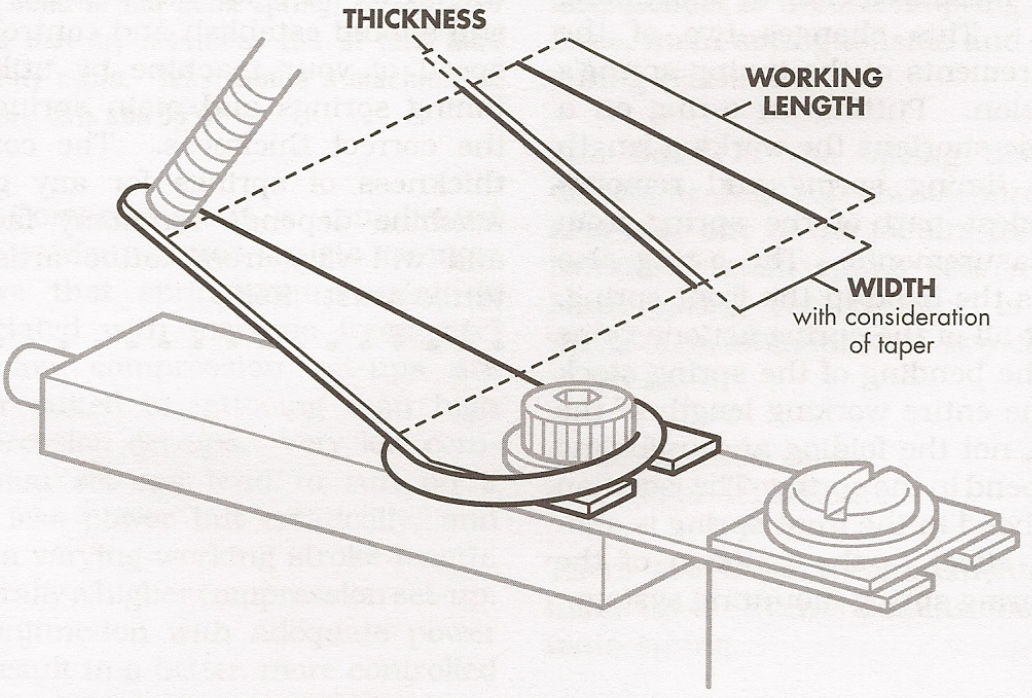
An o-ring changes machine function by changing timing spring function. Timing spring function is determined by two factors. They are: timing spring dimensions, and spring compression.

Timing spring dimensions are made up of a combination of three measurements:

TIMING SPRING DIMENSIONS



TIMING SPRING DIMENSIONS with O-RING



1. The working length of the spring, which is the distance between the contact point screw and the point where the timing spring makes contact with the armature bar or main spring.

2. The width of the spring, with consideration of the taper of the spring.

3. The thickness of the spring.

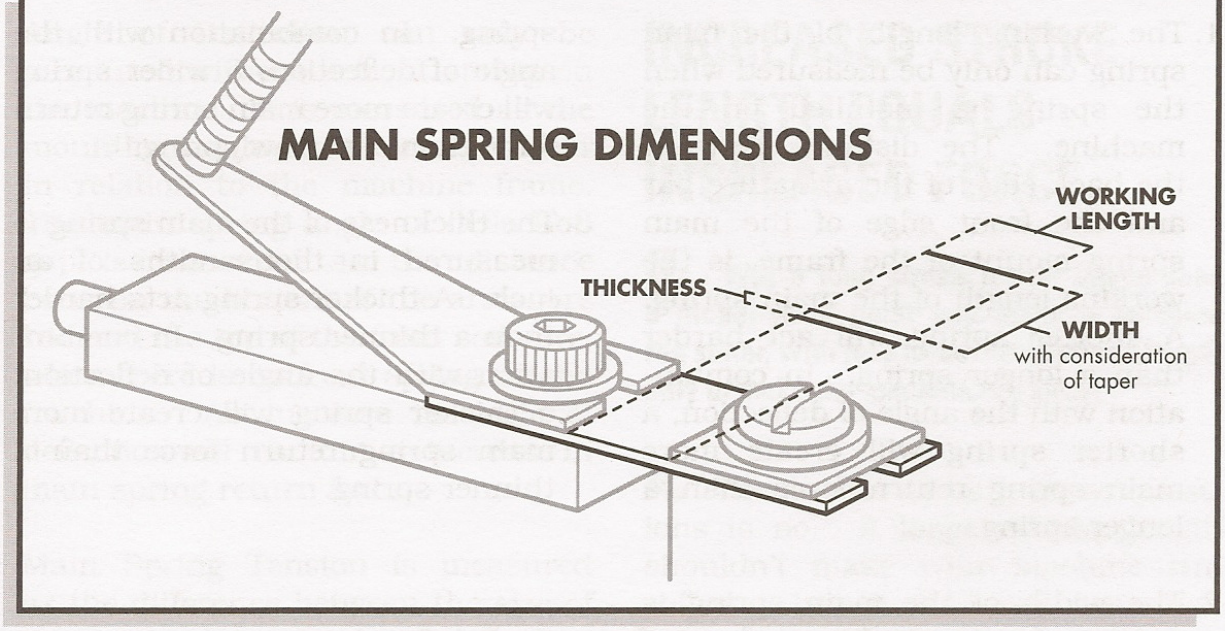
Spring compression is the term used to describe the interaction and combined effect of main spring return force and timing spring resistance.

The o-ring acts as a wedge under the timing spring at the point where the spring and armature bar meet. Any part of the spring that is in contact with the o-ring is not being used and therefore is not included in the overall measurements of the timing spring. This changes two of the measurements of the timing spring's dimension. Putting an o-ring on a machine shortens the working length of the timing spring and removes the widest part of the spring from its measurements. The o-ring also isolates the bend in the front spring, so that all of the spring actions come from the bending of the spring stock over the entire working length of the spring, not the folding and unfolding of the bend in the spring. The isolation of the bend in the front spring is similar in effect to the function of the Tru-Spring spring mounting system.

The changes to spring dimensions and function that an o-ring creates reduce spring compression by increasing timing spring resistance while not altering main spring return force. The end result is an increase in machine speed, and secondarily a change to the machine's sound.

Changing how a tattoo machine runs is most accurately achieved by changing spring thickness. That requires that you have access to springs or spring stock in various thicknesses. It is hard to believe, but some machine builders only use one thickness of spring stock for all the springs that they put on machines. O-rings are an imprecise way of changing machine speed if you do not have access to timing springs in varying thicknesses.

If you believe your machine sounds better with an o-ring on it, then put the o-ring on it for that reason. You still should establish and control the speed of your machine by utilizing timing springs and main springs of the correct thickness. The correct thickness of springs for any given machine depends on many factors and will vary from tattoo artist to tattoo artist. MGM



DUTY CYCLE SHOWS WHEN NEEDLES ARE IN THE TUBE OR STICKING OUT.

Q. I have a question about the duty cycle. I like to work with low compression (minimum bend in the back spring) which also means that my machines run at less than 45% duty cycle. Why should a machine be between 45% and 50%?

A. Compression is a complicated issue. Many tattoo artists wrongly believe that spring compression is associated with machine force, and that low compression set-ups are better suited to tattooing than high compression set-ups. Very low compression set-ups tend to run on a little less power but erratically, and with a varying working stroke length. Generally a higher compression set-up, in conjunction with adequate power will result in a better, more controlled and consistent running machine.

Spring compression is the term used to describe the interaction and combined effect of the main spring return force, main spring tension and timing spring resistance.

The bend in the spring does not determine high or low compression. It is only one of the factors that contribute to main spring return force. Main spring return force is made up of a combination of two factors, they are:

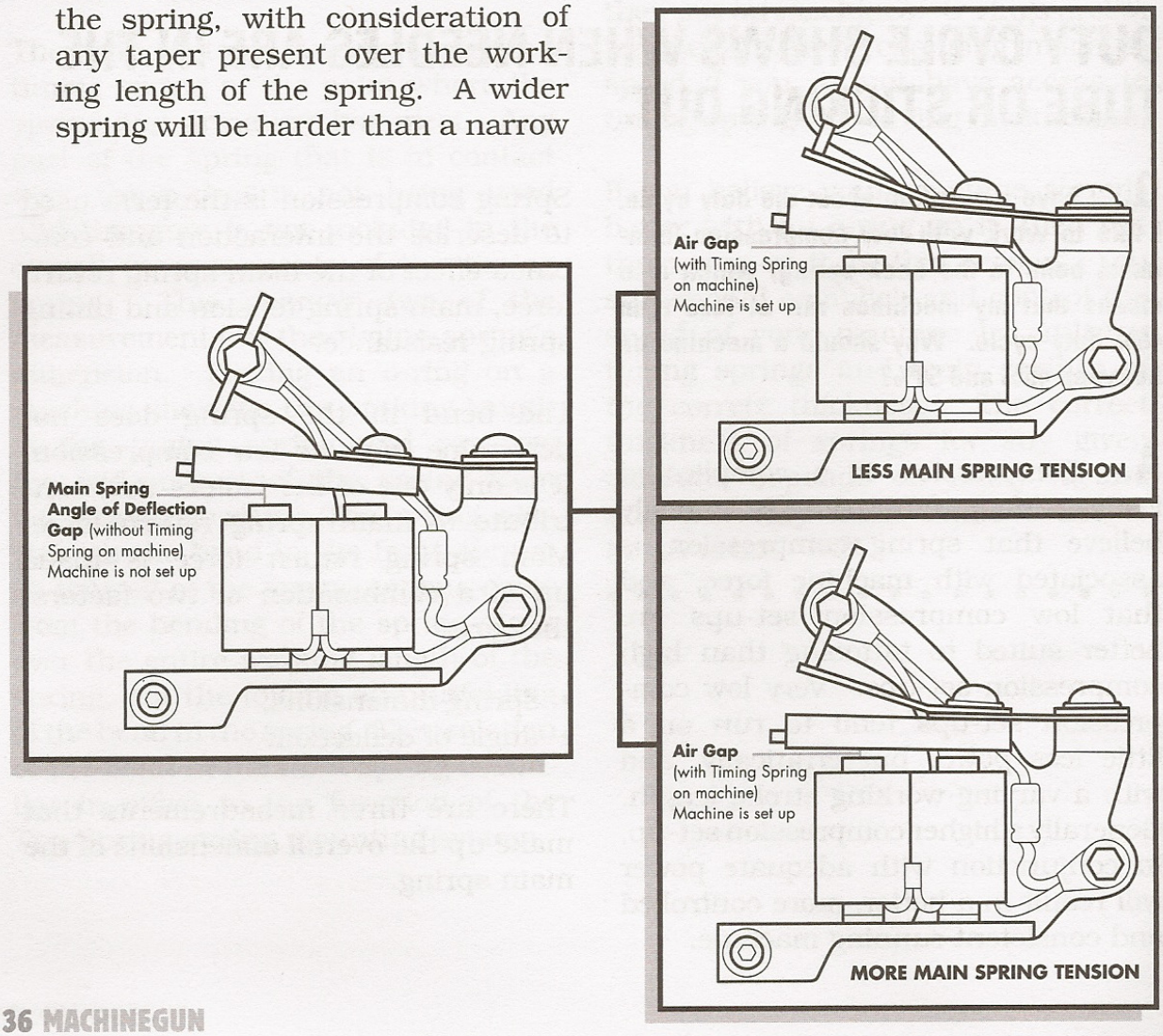
- spring dimensions;
- angle of deflection.

There are three measurements that make up the overall dimensions of the main spring.

1. The working length of the main spring can only be measured when the spring is installed on the machine. The distance between the back edge of the armature bar and the front edge of the main spring mount of the frame, is the working length of the main spring. A shorter spring will act harder than a longer spring. In combination with the angle of deflection, a shorter spring will create more main spring return force than a longer spring.

2. The width of the main spring is measured across the surface of the spring, with consideration of any taper present over the working length of the spring. A wider spring will be harder than a narrow spring. In combination with the angle of deflection, a wider spring will create more main spring return force than a narrow spring.

3. The thickness of the main spring is measured in thousandths of an inch. A thicker spring acts harder than a thinner spring. In combination with the angle of deflection, a thicker spring will create more main spring return force than a thinner spring.



Angle of Deflection can only be measured without a front spring on the machine. It is measured as the mounting angle of the armature bar in relation to the machine frame. The main spring angle of deflection gap is measured as the distance between the bottom of the armature bar and the top of the front coil core, when there is no front spring on the machine. An increase in angle of deflection will result in an increase in main spring return force.

Main Spring Tension is measured as the difference between the size of the main spring angle of deflection gap and the size of the air gap. The greater the difference between these two gaps the greater the main spring tension.

Duty Cycle is the measurement of the machine's closed contact time, or duration, compared to the open contact time, or duration. If duty cycle is below 50%, that means that most of the time the contact points are open and that the needles are sticking out of the tube tip. Generally that is not desirable. If duty cycle is higher, the potential for needles dragging in the skin is less and therefore there will be less trauma to the skin. The longer the stroke on a machine is, the more difficult it becomes to keep duty cycle high. For all machine set-ups, duty cycle should be kept as high as possible. MGM

INCREASED STROKE LENGTH EQUALS INCREASED FORCE.

Q. Will a long stroke length bigger than a nickel-sized point gap make a machine run softer, with less force? Or is stroke length only to make the machine run slow?

A. The answer to both those questions is no. A longer stroke length shouldn't make your machine run softer – but it can, and although increasing stroke length will slow down a machine, stroke length is not the best way to control speed.

Machine speed has to be linked to machine usage. You should always strive to get your machine running at the proper speed for how you tattoo. There are many ways to increase or decrease the speed of a machine. Any time you change the speed of a machine, you will change how much force that machine has. Don't forget, if you change the speed of a machine, you will change what that machine should be used for.

It is important to consider the power requirement of a proper machine set-up. Generally, on any set-up, if you under-power the machine by turning down the power output on your power supply, the machine will seem to have less force. If you check the speed and duty cycle readings of that under-powered set-up, you will see that the speed has dropped – and that's the only reason that there is a reduction

in the force that machine has. Not to mention that if the machine is under-powered, it is not running properly.

Required power is, in effect, required magnetism. If you turn up the power supply, the coils in the machine will become a stronger magnet. There is only one thing that the magnets in a tattoo machine have to do. Their sole purpose is to cause the armature bar to move downward. To do that, they have to overcome two factors: the resistance of the main spring, and the size of the air gap. If the size of the air gap or the amount of main spring return force is changed, then the required power of the machine will be changed.

If you increase the stroke length of a machine by turning out the contact point screw, two things change. It increases the size of the air gap, and it decreases the spring compression by decreasing main spring tension. Required power will be greater due to the increased size of the air gap. If the power is not increased, the machine will be under-powered. With adequate power, machine speed will be lower than before due to the increased stroke length. Duty cycle will be lower due to reduced main spring tension. The change in speed also changes the usability of the machine. If you don't intend to change the machine's use, you will need to adjust the speed back to where it has been. This should be accomplished by changing the springs on the machine to springs that are thicker. If you bring the speed and duty cycle back up, and have increased the stroke length, the force of the machine will be increased.

Force is generated by a combination of two variables – speed and mass. In any attempt to control the force of a tattoo machine, speed is the more usable of the two variables.

When calculating the force of a tattoo machine, the speed that the needle bar moves downward is the variable referred to as speed, not the speed of the machine. Machine speed is referred to as the number of cycles per second.

As an example:

Consider two tattoo machines, both running the same speed, that is, the same number of cycles per second.

- One machine with a stroke length of one-eighth of an inch.
- The other machine with a stroke length of one-quarter of an inch, twice as long as the machine with the shorter stroke.
- The machine speed is the same, they both go up and down the same number of times in one second.

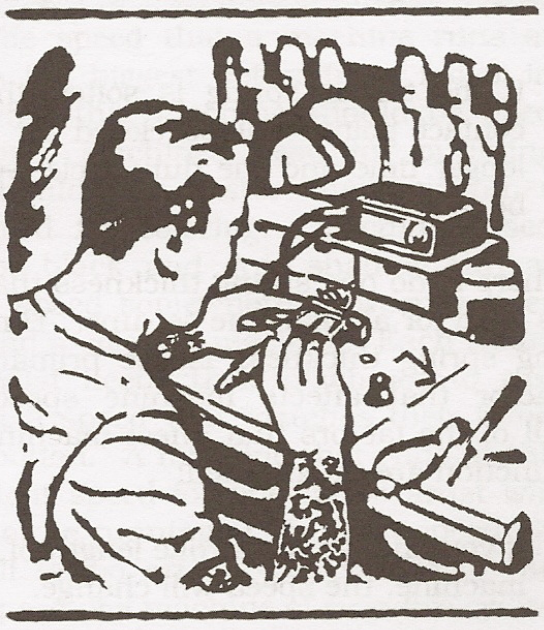
Now consider how fast each needle bar is moving up and down. The needle bar on the machine with the longer stroke is moving faster than the needle bar on the machine with the shorter stroke. The longer stroke means the bar must move further but cover that distance the same number

of times per second, therefore it is moving up and down faster.

If machine speed remains constant, a longer working stroke length increases needle bar speed, and that increases the force the machine has.

If machine speed remains constant, a shorter working stroke length decreases needle bar speed, and that decreases the force the machine has.

Increasing the stroke length of a machine is properly used to increase the force of a machine. MGM



THE TIMING SPRING CONTROLS MACHINE SPEED AND THE MAIN SPRING MAKES THE TIMING SPRING WORK.

Q. Not all suppliers seem to have springs for their machines with different thicknesses. So is there some kind of standard thickness that will work for front and back springs on most machines?

A. The front spring on a machine is called the timing spring.

The back spring on a machine is called the main spring.

It is important to match main spring return force to timing spring hardness.

- The main spring puts pressure on the timing spring at the contact point.
- The timing spring directly affects machine speed.

The relationship between timing spring hardness and main spring force is read as the balance between the length of time that the contact points are closed and the length of time that the contact points are open. This relationship is called the duty cycle of the machine. The duty cycle is read as the percentage of time that

Change Made to Machine	Resulting Change to Machine Speed	To Return Machine to Original Speed...
Increase stroke length	Machine will run slower	Replace timing spring with one that is thicker
Decrease stroke length	Machine will run faster	Replace timing spring with one that is thinner
Install larger capacitor	Machine will run slower	Replace timing spring with one that is thicker
Install smaller capacitor	Machine will run faster	Replace timing spring with one that is thinner
Install heavier armature bar	Machine will run slower	Replace timing spring with one that is thicker
Install lighter armature bar	Machine will run faster	Replace timing spring with one that is thinner

the contact points are closed during the cycle. If the contact points are closed 60% of the time during one cycle, and open 40% of the time during that cycle, then the duty cycle of that machine is read as 60%.

- If the main spring is putting more pressure on the timing spring, the contact points will be closed for a longer time and the duty cycle will be higher.
- If the main spring is putting less pressure on the timing spring, the contact points will be closed for a shorter time and the duty cycle will be lower.
- If the timing spring is harder, the contact points will be closed for a shorter time and the duty cycle will be lower.
- If the timing spring is softer, the contact points will be closed for a longer time and the duty cycle will be higher.

There is no one spring thickness that is good for all machine set-ups. Timing spring thickness is the primary factor that affects machine speed. All of the factors that affect machine function are interrelated:

- If you change the stroke length of a machine, the speed will change.
- If you change the capacitor on a machine to one with a different microfarad rating, the speed of the machine will change.
- If you change the weight of the armature bar on a machine, the speed will change.

If you alter any of those things on a machine and want to bring the speed back to where it was, you will have to change the timing spring to one of a different thickness.

Some tattoo artists and machine builders believe that spring stock that is 0.018" thick is the only thickness to use, but that is simply not true. On certain machines, springs of 0.018" thickness may work well, but that would be dependent upon many factors. These factors include the geometry of the frame, the size of the air gap, the size of the capacitor and most importantly, the speed that you want the machine to run at.

The speed that a machine runs at is the biggest determining factor in what that machine should be used for. Machines used for outlining should run faster than machines used for coloring. Machines used for black and grey shading run at a speed somewhere between a liner and a coloring machine. Each tattoo artist needs their machines to run at a speed that matches their hand motion. A machine that runs at the right speed for one tattoo artist will not be running at the right speed for all tattoo artists. A change to the speed of a machine of even five cycles per second can change whether or not that machine works well as a liner, shader or coloring machine.

MGM

PAPER OR GROMMETS, THE ONLY THING THAT MATTERS IS A SOLID CONNECTION.

Q. I have been to conventions and seen a lot of guys using paper towel to keep their needle bars in place instead of grommets. When I came back to work, my boss said why? I have yet to figure out the advantages. What are the advantages?

A. For some tattoo artists I'm sure that cost is part of it. Grommets do not cost very much but a little paper towel costs even less. Plus you have to remember to buy grommets while paper towel is usually easy to find. So paper towel is cheaper and easier to get... but that's not all. Grommets are kind of difficult to put into the needle bar and really the needle bar and grommet should never be re-used. Twenty years ago most tattoo artists put adhesive tape over the pin of the armature bar. The paper towel is sort of the same as the tape was, but like the needle bar now, it only gets used one time.

A lot of supply companies sell inferior needle bars with teardrop-shaped eyes that a grommet won't fit tightly into. So, the grommet will move around in the eye of the needle bar, which is not a good idea.

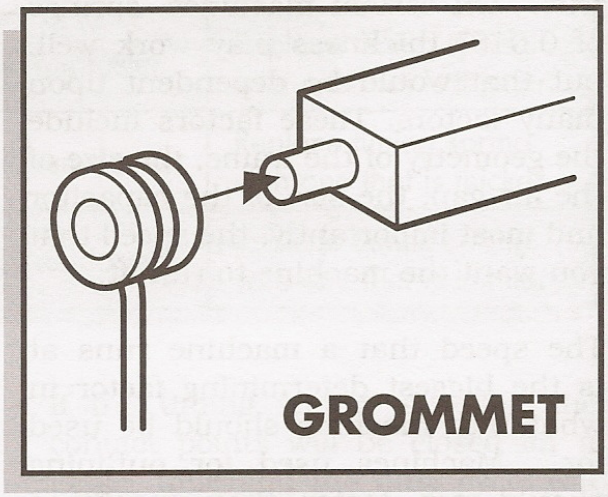
The pin on the armature bar is another point of consideration. If the armature pin is too small, or poorly

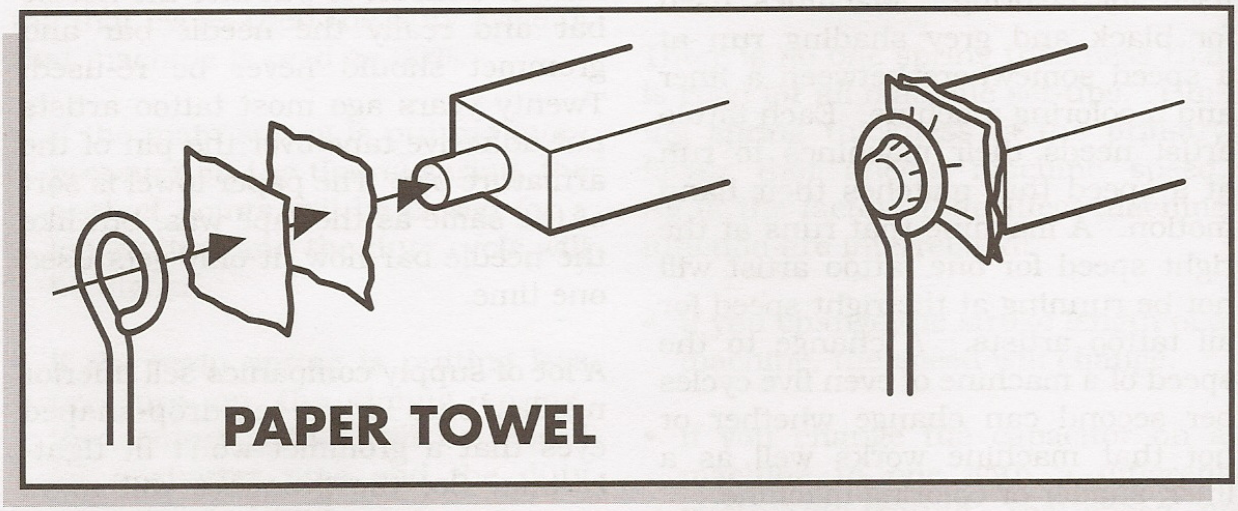
manufactured, the grommet won't fit snugly onto it. With low-quality needle bars and armature bars, you can wedge enough paper towel between the teardrop shaped eye and the armature bar pin so that the two stay solidly connected.

There should be no play at the connection point between the needle bar and the armature bar. Eikon needle bars have a round eye, so the grommets fit into them snugly; still we suggest that you crimp the eye tight around the grommet to ensure there will be no play at that connection point. Eikon and Tru-Spring armature bars have a precision machined pin that a grommet fits tightly onto.

If you're dealing with high quality components that all fit together, grommets are probably better – but if you're faced with cheap needle bars or armature bars that grommets don't even fit into... you're probably better off with the paper towel. Bottom line – there must be no play between the needle bar and the armature bar.

MGM





COIL RESISTANCE IS A MORE ACCURATE RATING THAN NUMBER OF WRAPS.

Q. What is the difference in the number of wraps on a coil? I'm sure it's a matter of magnetism, but I can't get over the idea that less wraps equals greater magnetism. Is this right?

A. The coils that are used in tattoo machines are basically iron or steel cores with insulated wire wrapped around them. The number of wraps on a coil refers to the number of layers of wire wrapped around the coil core. The wire is wound onto a bobbin which is pressed onto the coil core. The bobbin establishes the top and bottom edge of the windings. The wire is fed through the bottom washer of the bobbin, then wound around the inside sleeve of the bobbin until the top washer of the bobbin is reached.

The second layer, or wrap, is wound downward on top of the first wrap, the next upward and so on until the desired number of wraps are wound around the coil core.

When power is run through the wire, the core becomes magnetic. When the power is interrupted, the magnetism in the coil core dissipates and the coil returns to its non-magnetic state.

The speed at which the entire magnetic system dissipates magnetism is an important factor in how well the coils work in a tattoo machine.

The number of wraps on a coil really amounts to the length of wire on a coil. More wraps means longer wire. The wire is measured as a resistance in Ohms. Longer wire creates more resistance.

Resistance should be measured as a pair of coils with no capacitor included. The coils must be wired together and disconnected from the top and back binding posts of the machine.

Number of wraps is a way of describing the coils, but it is a very imprecise description. The resistance of the coils affects machine function, but the number of wraps does not. Coils for tattoo machines are generally manufactured in two heights: inch and a quarter and one inch. A shorter coil will have less length of wire on each wrap than a tall coil. A 1 1/4" tall, 8-wrap coil will have greater resistance than a 1" tall, 8-wrap coil. Both coils would have the same number of wraps, but different resistance.

The resistance is measured as a pair of coils, so the pair does not even need to have the same number of wraps. It's only the overall resistance of the pair, in Ohms, that matters.

When power goes through the first coil, the core becomes magnetic, so does the frame of the machine (or the yoke) and the core of the other coil. This all happens at the same time.

It's not one coil becoming magnetic first and then the other coil afterwards. The coils are a pair, they work together as a single component.

The higher the resistance, the more power is needed to create a given amount of magnetism. Coils with less wraps generally have less resistance and will therefore create equal or greater magnetism with less power. That does not mean they can create a stronger magnet, but they can create equal magnetism with the power supply turned down a little.

If resistance is too high, the coils will generate an overly strong magnetic field that dissipates slowly. If resistance is too low the coils will generate a weak magnetic field that dissipates quickly.

Coil resistance must work in conjunction with coil core mass and material. The capacitor and spring compression on the machine, both affect coil function greatly.

Coils are only one part of a machine that is made up of many components and systems that are all interrelated.
MGM

TRIAL AND ERROR IS STILL THE SIMPLEST WAY TO FIND THE RIGHT CAPACITOR FOR YOUR MACHINE.

Q. Some of my liner machines have big capacitors on them. I can't tell what the microfarad rating is because they are covered with heat-shrink. The caps are the same size as the ones on the shader machines I bought from the same supplier. Should I put smaller capacitors on the liners?

A. I'm always hesitant to encourage anyone to change something on a machine if it's working right... but when you're talking about capacitors, I'll tell you it's always a good idea to remove any capacitor that is soldered together with the coil leads.

A lot of machine builders and supply companies use capacitors to alter or control the speed of the machines they sell. Why they do it is a complicated question, but usually those are the builders who also only use one thickness of spring stock. So I wouldn't worry too much about why they do the things they do, but I would take the original capacitor off of that machine.

Once you're dealing with pre-wired capacitors it's really easy to try out different microfarad ratings and really get the right capacitor on your machine.

You'll often hear 22uF for a liner and 47uF for a shader. Truthfully, the only way you can get exactly the right capacitor for your set-up is to try them. There are just too many factors that the capacitor interacts with to be able to predict for certain what size of capacitor will be right. You would need to know the resistance of the coils, their rate of magnetic dissipation, the stroke length of the machine, the spring compression and the desired speed of the machine. Then you would need to consider all of those factors at once. They might balance each other out or add up to something unexpected, but certainly the calculation of it all would be complex. The simplest way to approach finding the right capacitor for your set-up is trial and error.

The main purpose of the capacitor on a machine is to eliminate spark at the contact point. You can run a machine without a capacitor, but there will be a large bright spark at the contact point. The spark carries power and therefore extends the closed contact duration, raising the duty cycle and keeping the coils energized longer than you probably want. By eliminating the spark with a capacitor, we can more accurately control the speed and duty cycle of the machine.

When choosing a capacitor, you should first run the machine with no capacitor. There will be a large spark and the duty cycle will be high, but the speed reading will tell you roughly where the mechanical set-up of the machine is at. If the machine runs too slowly with no capacitor on it, you should change the springs on the machine until the speed is close to what you want. If the machine runs too quickly with no capacitor on it, you should change the springs on the machine until the speed is close to what you want.

By setting the speed of the machine first and without a capacitor, it will be less likely that you will put an oversized capacitor on the machine.

Once you have the machine running roughly the right speed, you can begin trying different capacitors. Start with a small capacitor. Check the speed and how the machine runs. Then put on a slightly bigger capacitor, see if the machine runs better with the bigger capacitor. Then proceed to an even bigger capacitor.

The right capacitor should not slow the machine down too much. An oversized capacitor will cause the duty cycle to drop. Once you feel you've gotten the right capacitor, you might still have to adjust the springs to get exactly the machine speed that you want. Remember, the main purpose of the capacitor on your machine is to eliminate the spark at the contact points, then you can get the right springs on the machine to control machine speed and duty cycle. **MGM**

TATTOOING WHAT HAPPENED?

by Bill Baker

I know why most of you think voltage is so important to your machines and how they run. I also know that you don't even know why you believe that, and I can prove it. Here's the proof: if you knew why you believed voltage is such a big deal, you would also have to know that voltage alone is not such a big deal to how your machines run. Tattoo machines don't just run on voltage. They run on voltage and amperage, which is measured as power running through the coils of the machine in wattage.

Don't feel bad, it's not really your fault... Well, it's your fault if you believe in things without questioning them. But really, this is your big opportunity to blame suppliers for your troubles... finally... and what a pile of problems they created when they got tattoo artists to care about voltage.

This is the way I figure it happened. Tattoo suppliers are just people like anybody else, and back in the 70's people wanted to be modern. So, some supplier figures the trade might want to be modern. He figures the power supply should be more modern, maybe it could look like a stereo or something. These guys found a power supply that had a voltmeter in it, an analog dial meter with a needle that bounced around to show the voltage. Now, in the 1970's that did seem modern, and as predicted, tattoo artists bought the power supplies with the voltmeter. What they didn't know was that they were buying a power supply that was fundamentally different than the old power supplies that they had been using. Up until then, everybody had been using a variable resistance power supply. The new power supplies with the voltmeters were variable voltage power supplies. They controlled the power to the machine in a different way than the old power supplies did. I really believe the suppliers and the tattoo artists were only looking for a supply that looked more modern. What they got was actually a better power supply for running tattoo machines.

Once the tattoo artists had a voltmeter to look at, they realized that if they adjusted their machines a certain way, they could turn down the voltage. This was an important point in the history of tattooing. For the first

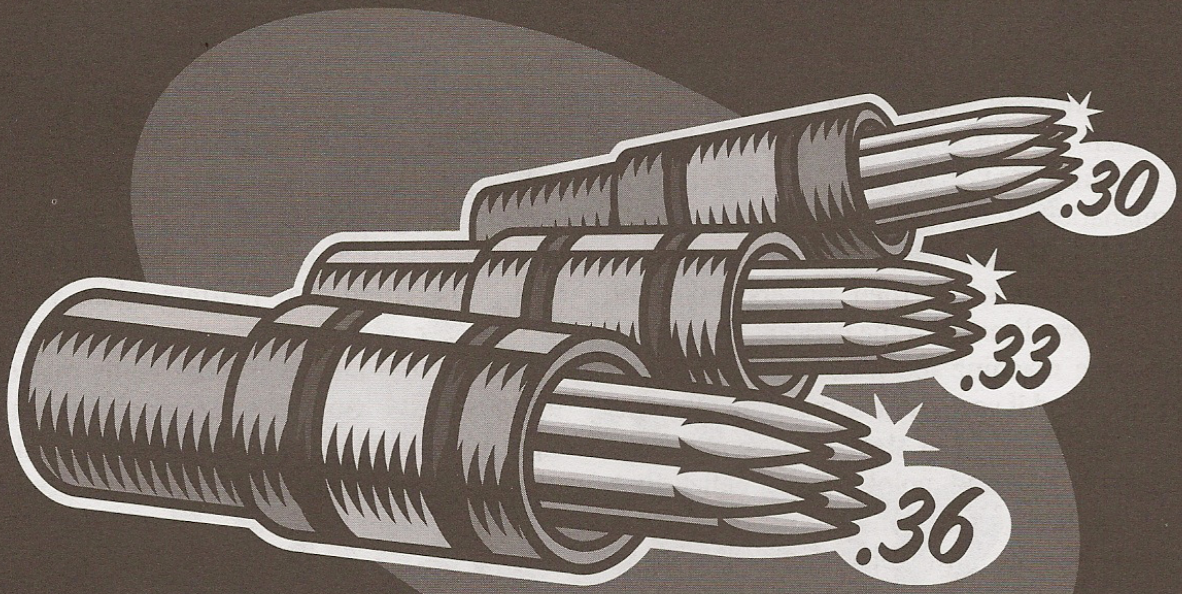
time, tattoo artists could actually measure something that was related to the function of their machines. Unfortunately, it was a measurement that didn't come with any explanation from the suppliers. Many tattoo artists wanted to improve the function of their machines, but their understanding of voltage was limited to the concept that if you gave the machine too much voltage, it ran terribly, and if you gave the machine too little voltage it would just stop. This would have been the starting point of the belief that less voltage is better. With no other measurements available to them, many tattoo artists attributed an importance to low voltage that was simply unwarranted. A lot of tattoo artists became low voltage happy. After a while it didn't matter if their machine was running good or right... they just wanted low voltage.

Now first of all, how much power a machine needs depends on how the machine is set up. If you keep changing the set-up in favor of low voltage, you will end up with an underpowered machine. It will probably be slow running, with a low duty cycle. Both these factors, low speed and duty cycle, would contribute to that machine running with almost no force. Here's where the trouble really starts. If your machine doesn't have enough force, it can't drive a big configuration of needles, or any configuration made of needles with a big working diameter. There are only two possible solutions to the problem of a machine that does not have adequate force to drive a proper needle configuration. Fix the machine set-up, or find a needle configuration that presents less resistance. Fixing the machine set-up would mean increasing the power to the machine. A tattoo artist with too much low voltage damage could not bring themselves to do that, so they started using needles with a smaller working diameter, even as small as bug pins.

I'm not saying voltage doesn't matter... it does, but speed and force are the measurements of machine function. Measuring voltage on a tattoo machine is kind of like measuring gas mileage on a car; the two would be even more similar if gasoline was free. The thing that matters when you're driving a car is that you are going somewhere. Doing tattoos is what really matters in tattooing. So get your machine speed right, get enough force to drive your needles, give your machine all the power it needs... and get to work. **MGM**

Hawaii
1966

Hawaii
1977



Precision is our strong point.

At Eikon, we know that size does matter - especially when it comes to tattooing needles. We also know that different styles of tattooing require different needle diameters and tapers. That's why we manufacture precision ground tattooing needles in three different diameters, in both long and short taper, to meet all of your tattooing needs.

Precision ground needles were the first product we manufactured and sold at Eikon. In fact, we were the first company to design and manufacture needles specifically for tattooing. We did the research and we still do all the manufacturing at our factory. Every aspect of production – from straightening and cutting wire, to grinding, measuring and hand packaging the needles – is done at Eikon, to standards that we've set for the entire industry.

When it comes to needles for tattooing, we wrote the book.

The original and the best.

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COLORING CONTEST

1. YOU MAY COLOR THE ORIGINAL COPY OF THE PICTURE, A PHOTOCOPY (OF THE SAME SIZE) OR A REASONABLE HAND-DRAWN FACSIMILE 2. YOUR ENTRY MUST INCLUDE: YOUR FULL NAME, COMPLETE MAILING ADDRESS (INCLUDING POSTAL/ZIP CODE AND ANY APPLICABLE SUITE/APARTMENT NUMBERS) AND TELEPHONE NUMBER 3. ALL ENTRIES BECOME THE PROPERTY OF MACHINEGUN MAGAZINE 4. MACHINEGUN MAGAZINE RESERVES THE RIGHT TO PUBLISH ALL ENTRIES RECEIVED ALONG WITH THE FIRST AND/OR LAST NAME AND THE CITY THAT THE ENTRY WAS RECEIVED FROM 5. ENTRIES MUST BE RECEIVED NO LATER THAN FEBRUARY 28, 2006 6. MACHINEGUN MAGAZINE AND EIKON DEVICE INC.™ ARE NOT RESPONSIBLE FOR LOST OR MISDIRECTED MAIL OR INCOMPLETE ENTRIES 7. ALL ENTRIES WILL BE JUDGED AT MACHINEGUN MAGAZINE HQ. THE DECISION OF THE JUDGES IS FINAL 8. EMPLOYEES AND RELATIVES OF EMPLOYEES OF MACHINEGUN MAGAZINE AND/OR EIKON DEVICE INC.™ ARE INELIGIBLE TO WIN 9. THE NAMES OF THE WINNERS MAY BE USED FOR PUBLICITY PURPOSES WITHOUT FURTHER COMPENSATION 10. ANY ENTRIES MAY BE PUBLISHED 11. WINNER WILL RECEIVE AN EIKON POWER SUPPLY, FOOTSWITCH, CONNECTOR CORD AND FOUR RCA CONVERSION KITS.

ENTRIES MUST BE MAILED TO: MACHINEGUN MAGAZINE, COLORING CONTEST, C/O EIKON DEVICE INC., 692 MCKAY STREET, KINGSTON, ON, CANADA K7M 7G2. (DON'T FORGET YOUR CONTACT INFO!)

CONGRATULATIONS
DANIEL INNES
WINNER OF LAST ISSUE'S COLORING CONTEST!

WINNER!

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- ★ Gem footswitch with 1/4" mono plug wired with Eikon 18 AWG silicone **MONSTER** wire - the **ONLY** wire designed specifically for footswitches!
- ★ RCA connector cord with 1/4" mono plug wired with Eikon 22 AWG super light silicone wire
- ★ Four Eikon RCA conversion kits

Entries must be received no later than February 28, 2006.

Check online for all past and present coloring contest entries.

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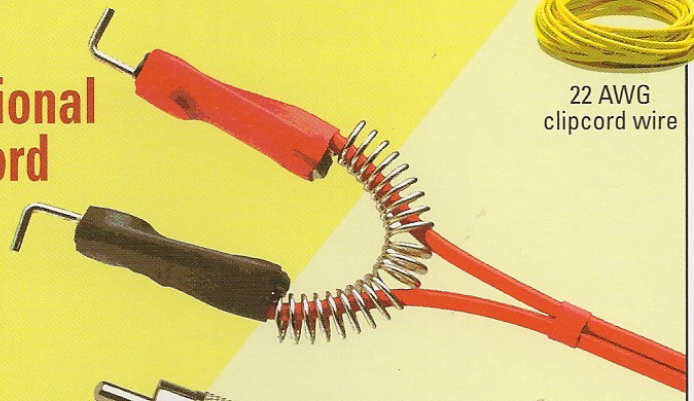
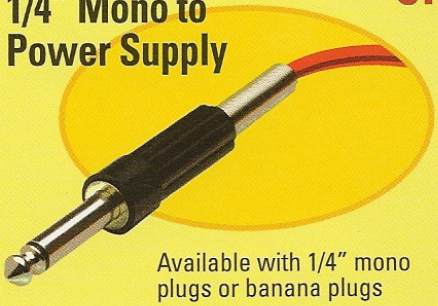
22 AWG clipcord wire

Traditional Clipcord



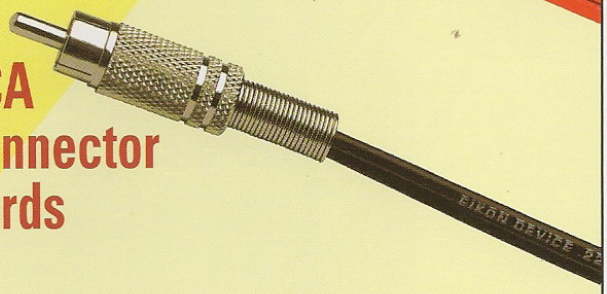
1/4" Mono to Power Supply



Available with 1/4" mono plugs or banana plugs

Banana Plugs to Power Supply

RCA Connector Cords



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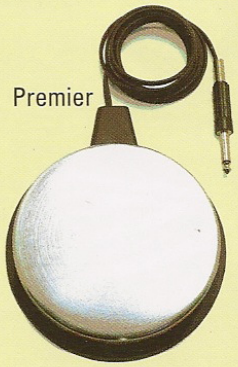
Gem



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SILICONE CLIPCORD & FOOTSWITCH WIRE

18 AWG footswitch wire

For a complete listing of clipcords, footswitches, RCA conversion kits and disposable surface barriers (including clipcord sleeves) go to:

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